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the author

OBSERVATIONS

(HISTORICAL & CLINICAL)

ON

GLYCOSURIA,

BY

ALEXANDER N. DOUGHERTY, M. D.,

NEWARK, N. J.



Extracted from the Transactions of the Medical Society of New Jersey.

L. J. Hardham, Printer, Newark, N. J.

1878.

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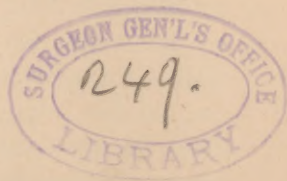
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ESSAY.

BY ALEXANDER N. DOUGHERTY, M. D., OF NEWARK.

OBSERVATIONS ON GLYCOSURIA, HISTORICAL AND CLINICAL.

It is just three and twenty years this Spring since I was in Paris, in company with a valued friend, who is numbered in the list of our ex-Presidents. We took the occasion which some weeks' sojourn gave us, to follow the eminent men in our profession who were treading the *salles* of the hospitals, or giving forth the results of original research from the professor's chair. Among these, of world-wide reputation, were Velpeau, the famous surgeon, whom our own no less distinguished Mott edited; Jobert, then performing, as he thought, with all possible success the operation in which our Sims was destined far to surpass him—that for vesico-vaginal fistula; Maisonneuve, whom we saw (among the earliest, if not the first, to do it) forcibly dilate the anus for fissure, as a substitute for the then universally practiced division of the sphincter; Chassaignac, the inventor of the *ecraseur*; the elegant operator, Nelaton; Civiale, the father of lithotrity, of whose dexterity in using the lithotrite we had ocular demonstration; Rostan, the distinguished pathologist—who, however, made on me a deeper impression than by his renown—from the fact that he was followed by a coal-black negro, a man who might have come from

Central Africa and the near companionship of gorillas, but who here was honored by being, by his own merit, in glorious France, the land of practical democracy, the first *interne* in Rostan's train at the Hotel Dieu ; Piorry, devoted to auscultation, and more especially to percussion, the invention of Avenbrugger, before Laennec brought in the former to throw a new and immense light on chest diseases ; and Dubois, the accoucheur of illustrious lineage, the son of the eminent accoucheur who put Maria Louisa to bed, and to whom Napoleon, with the common sense that ever distinguished him, when he found the physician overwhelmed with the responsibility of his delicate office, said : " Sir, treat her as you would a baker's wife." This Dubois, however, of whom I write lives in my memory chiefly because I was present in the theatre of the Hopital de l'Ecole de Medicine when he performed the operation of the cæsarian section on a poor, unfortunate, deformed woman, who died, as was usual, on the third day, partly perhaps because the surgeon took no stitches in the abdominal walls, but relied on the *serres fines* of Vidal de Cassis, which gave way when peritonitis set in and allowed the escape of the bowels, puncture being required before they could be reduced. I must not omit from this list the genial professor of the Hopital du Midi, the great syphilographer, Philippe Ricord, whose fame is coextensive with the medical world, and whose name will be forever associated with that of the great John Hunter, in connection with the disease called distinctively French, just as diabetes was formerly known as English. The last name I recall is that of one who has especial relation to the subject of my essay on this occasion, Claude Bernard, the discoverer of the glyco-

genic function of the liver, about eight years before, viz.: in 1847, and whom I saw demonstrate his doctrine by vivisections on dogs and rabbits at the College de France. This most original and inventive genius in physiology—the greatest advancer of it since Harvey—is just dead, but will forever live in the remembrance of his illustrious discovery, which is not only of high scientific, but also of the first practical importance; and would of itself, notwithstanding Bergh and the whole tribe of humanitarian objectors, be sufficient to justify all the vivisections that have ever been made since the days of Hippocrates. Believer in evolution as I am, I yet think man is worth many flocks of sparrows. “Is thy servant a dog?” Nay, he is worth all the dogs that ever went on four legs, or than all the monkeys, his congeners, that ever went partly on two.

The phenomenon of glycosuria or saccharine urine is invested with a peculiar interest because it enforces the doctrine now becoming prevalent that disease is not an entity, but a condition of want of physiological equilibrium.

A state which now may be included in the boundaries of physiology, and anon in those of pathology, is well calculated to give support to this doctrine. A recent French writer, Mr. Duhomme, in the *Gazette Hebdomadaire de Medicinie et Chirurgie*, maintains that glycosuria and diabetes mellitus are two distinct diseases, not always indeed easily distinguishable—but at least so by their course under treatment. That the former is very common, and yields to the classical diet—while the latter is not amenable to any treatment whatever, but marches to a fatal termination with absolute certainty. What I shall have to lay before you, may yield some support to this theory. At least

my own investigations have inclined me to a similar conclusion with regard to the frequency with which sugar appears (often unrecognized and unsuspected) in the urine ; but of course such cases may be considered either as examples of a condition distinct from diabetes, or of a mild form or inchoate state of the latter.

Another feature of this disorder which invests it with interest is that it belongs to a class characterized by chemical abnormalities in the secretions or fluids of the body—a class including gout, which Garrod has shown to have for its distinguishing feature the presence of uric acid in the blood—rheumatism in which lactic acid has been similarly found ; scurvy alleged of late to be due to a deficiency of potash in the circulation ; uremia, the fatal character of which and the convulsions and coma accompanying it are ascribed to urea, a product of the waste of the economy which should be eliminated by the kidneys, being left behind to exert through the blood a toxic influence on the brain ; and azoturia in which the urine is abnormally charged with the same product. All these are deviations from physiological correctness, and when the essential elements which constitute them are presented before us in the test-tube or under the microscope, an achievement which was only possible in these latter days, we are already far on the way to master them, and thus restore the disturbed physiological equilibrium. More especially shall we be able to apply the famous axiom “prevention is better than cure,” for we shall know the rocks and shallows that it is our business to point out to our patients.

HISTORY.

The history of our knowledge of glycosuria is of

interest, and we will consider it briefly. Indeed the early records of our art are rather a history of our ignorance of this condition, for its essential feature, that indicated in its name, was only known of late years. But diabetes is discussed by old authors, though only noticed as a profuse flow of urine accompanied by emaciation.

The word diabetes, although of Greek origin, does not occur anywhere in the works of Hippocrates, nor does he appear to have noticed the disease. Some writers in their reverence for this great man, whose penetration and wise observation are so conspicuous, will not allow that a malady so marked as this could have escaped his notice, and they quote a passage which they claim contains an abridged description of it. But the passage in reality simply rebukes the errors which patients commit in their abuse of drinks. I derive most of the information here presented, on this part of my subject, from the article "Diabetes," by Renauldin, in the *Dictionnaire de Medicine*, Paris, 1814, who says, "Diabetes does not appear to have been unknown to Celsus, who evidently indicates it by these words: '*Quum urina super potionum modum mingitur, et jam sine dolore profluens, maciem et periculum facit*;' When the urine is passed in excess of drinks, and without pain, it produces emaciation and danger."

I have taken the trouble to translate from Aretæus the Cappadocian, his account of the disease and its treatment, as a sample of what was known about it in the first century of our era. Book II. Semioticon, chap. 2: De Diabete. "There is a certain wonderful affection, not very common among men, viz., Diabetes. It is a melting down of the flesh and limbs into urine.

Of this, as of dropsy, the cause is damp and cold. But the liquid flows away by the customary passages, the kidneys and bladder. For the patients never cease to urinate, but as when rivers are opened, there is a perpetual effusion. This disease a long time latent, is a long time in being established. But when its constitution is fully fixed, the man does not long survive, for exhaustion is rapid, and death comes on apace. Moreover, life is hideous and wretched, the thirst intolerable, potions numerous, the amount of which nevertheless the urinary secretion must exceed; nor can one prevent the patient either from drinking or urinating. For if he abstain from drinking for a brief space the mouth is parched, the skin husky; the bowels themselves seem burned up; he is in distress and misery and soon dies; meantime he is tormented as if on fire. And what amount of argument can control micturition, or how can bashfulness be superior to pain? For if the sufferers hold their water even for a short time, the bowels, hips and testes swell up; if they pass it the swollen parts subside, for the liquid is borne away to the bladder. When the malady is at its height it is easy to be recognized, but in the beginning the mouth is dry, the saliva white and foamy, as in thirst, while as yet thirst is not urgent; there is a weight at the epigastrium. At the invasion of the disease there is a sensation of cold and heat extending from the throat to the bladder; occasionally more urine than ordinary is passed, and there is thirst, but nothing remarkable. When it has advanced further, the heat is moderate but the bowels are consumed—the abdomen is rugous, the veins are prominent, and the whole frame is wasted; and now the flow of urine and the thirst are more and more augmented, and

when the disease has reached the end of the penis the flow of urine is abundant. I think it is called diabetes from *diabeten*, which means a syphon, because the fluid does not remain in the body but uses the man as a conduit to pass off by. The patients endure some time, but not very long, because they urinate with distress, and exhaustion is rapid. For from the drink, nothing to speak of enters into the composition of the body, while a great part of the flesh flows off with the urine. The cause of this disorder must be some acute affection which furtively leaving something malignant behind, in its crises, at length degenerates into it. Nor is it incredible that its cause is some pernicious poison at length infesting the kidneys and bladder. Moreover if a serpent, called dipsas, has bitten any one, this affection supervenes from the sore, for the reptile sets up an immediate thirst in those bitten by it, and the sufferer drinks prodigiously, though without being satisfied, the belly meantime being overflowed through the inextinguishable desire for drink. But if through oppression of the belly from distension he ceases to drink, thirst forces him to it again, and so these evils succeed each other by turns. For thirst and drink conspire together for his destruction. Some do not pass water, nor is their drink excreted through other openings of the body, whence it happens that on account of the insatiable avidity for drink, and the overflow of the humor and consequent distension of the belly, they speedily burst."

The following was his treatment: Book II, Therapeutics, Chap. 2. Curatio diabetes. The disease called diabetes, if you consider its cause and nature, is a species of dropsy, differing from it only in the part whence the humor makes its exit. For the membrane

called the peritoneum is the receptacle of ascitic humor, nor does the latter have any vent, but remains to flood it; while in diabetes it is carried off from the body of the man, who in like manner pines away; but the liquid flows towards the kidneys and bladder, and passes out by these parts. This is the passage for the water in dropsy, if the disease incline to yield. But the removal of the cause is necessary, and not merely an alleviation of the burden. In diabetes, thirst is urgent, because the flow of water dries up the body. The same means of cure are to be applied to this consumption as to dropsy. There is great need of remedies for extinguishing thirst; it far surpasses all other sufferings, and whatever is drunk provokes urine, which on flowing away carries off with it the body in a liquified state. Therein those remedies are necessary which temper the thirst; for that is present with an inextinguishable desire for drink, which no abundance of liquids however great can allay. These remedies should be applied to the stomach, which is the seat and origin of the thirst. So the belly being first purged with *hiera*, use epithems of nard, mastich, dates and unripe quinces; the juice of which with nard and rose oil does best for pouring on; but the pulp (of quinces) with mastich and dates is good for a poultice, and therein should be mixed wax and nard ointments; or the juice of the acacia and the hypocystis may be applied in a poultice or by lotion. Water should be used for drinking which has been boiled with the fruit called opora; for food, milk and such things as may be boiled with it, starch, spelt, decoctions, astringent wine for strengthening the stomach, very pure for evaporating and dissipating the other humors; if salted this induces thirst; but astringent

and cooling wine modifies and tempers the body ; also sweet wine, like the blood, renews the strength because it creates blood. The medicines to be used are like the *mithridate*, which is made from opora, and others such as are of benefit in dropsy. Moreover there should be a strict rule of diet, and government of life."

The diabetics of that time were fortunate not to be dosed with the disgusting compounds which make so conspicuous a part of the *materia medica*, even down to a period past the date of Harvey's discovery. Theophilus Bonet in his treatise, *The Practical Physician*, a translation of which was printed in London in 1685, gives some of them as in use in his time, though not particularly for diabetes, which he calls "The Piss-Pot Dropsie."

It is Celsus, I think, who mentions as a remedy for epilepsy, the warm blood of a gladiator just slain ; and remarks, that a wretched disease may justify a miserable remedy. And Bonet quotes from some author the prescription of the powdered bones of a man's skull in the same malady.

Among "medicines made use of by eminent physicians," he mentions as beneficial in erysipelas the following from Agnecola: "Let a linen cloth be dipped in a virgin's menstruum, dry it, and when there is occasion, cut a piece of it off and steep it in vinegar of roses to draw out the tinteture, apply it warm and repeat several times. It presently draws out the heat."

To return from this digression, I have thought it worth while to record at some length the account given by Aretæus in order to show that while the ancients knew the disease they did not recognize its essential quality the saccharinity of the urine. The first man who did recognize it, was, so far as we know, the cele-

brated Willis of England, who lived in the earlier part of the 17th century, and who mentions it in his writings but made no impression on his contemporaries. Jno. Rollo, called by Bernard a Portuguese physician, but who certainly wrote his treatise in English, and published it in London in 1797, under the title "An account of two cases of Diabetes Mellitus, to which are added a general view of the disease, etc.," found sugar in the blood of diabetics, and recommended the now universally used nitrogenous diet.

Renauldin says, "it was reserved for Dr. Cauley, in 1778, to demonstrate completely the presence of sugar in the urine: and for M. M. Nicolas and Gueudeville, in 1803, to give us a very good comparative analysis of saccharine and ordinary urine, and finally, for M. M. Dupuytren and Thenard to confirm, in 1806, by very interesting experiments, the results which their predecessors had obtained and to add new facts."

Renauldin, himself, makes the singular mistake of stating that the urine in diabetes is less heavy than in health.

This was about the extent of our knowledge on the subject of glycosuria, when Bernard began his important labors in regard to it. He found sugar not only in the blood of diabetics, but in all mammalian blood, under circumstances of good health, and in fact as a condition of it, since it was never wholly absent, though much diminished in cases of starvation and wasting disease. He found further that the proportion of it in the arterial was invariably a little greater than in the venous blood of the extremities, being in the former something over, and in the latter a little under one part in a thousand; and drew from this difference the conclusion that it was consumed in the organism

being turned into lactic acid in its passage through the capillaries of the muscles. Hence he inferred that active exercise was an important means of cure, a conclusion that clinical investigation has amply justified; indeed, Dr. Morrison, of England, himself a sufferer from diabetes, lays peculiar emphasis on this resource, considering it of the first importance, and urging all his fellow sufferers together with strictness of diet, to use active exercise no matter how repugnant it may be to their inclinations. With regard to the influence of diet in the production of sugar, Bernard found that the quantity was augmented by a starchy and saccharine diet, and diminished by one exclusively animal, but that (contrary to his first teachings) while it was always present in small quantities in the portal vein, under all circumstances of diet, it was increased there and especially in the *vena cava* and the hepatic veins by the former diet, whence he deduced the conclusion that the liver acted as the producer of sugar from the materials brought to it through the portal vein. This was what he called the glycogenic function of the liver; and in his latest work, published only last year, (and his last, too, for the scientific world has just suffered incomputable loss in his death,) he has given his matured conclusions on the subject, which had occupied so large a portion of his attention. These conclusions are that the liver acts as a receptacle for sugar which it stores up under the form of glycogen, an insoluble substance, a sort of animal starch, and which he showed to have a striking resemblance to vegetable starch, not only in its reactions, but even in forming explosive compounds with nitrogen. That this advanced product glycogen is reduced again to sugar for the uses of the economy, just as starch is in

the vegetable, by means of a special ferment (which again is analogous to diastase,) existing in every part of the organism, but furnished especially by the salivary glands, the pancreas and the follicles of Lieberkühn in the small intestines. This ferment he isolated, and showed its action even outside of the organism. He thus suggested a remarkable parallelism between animal and vegetable physiology—that the animal like the vegetable is able to construct, to raise from the simple to the more complex, and is not merely a reducing agent, “*natus consumere fruges.*”

We owe to Bernard, as I have said, our knowledge of the physiological presence of sugar in the blood, both of flesh eating and vegetable eating animals, in the proportion of a gramme to a gramme and a half per thousand. Dickinson, following Simon, does not reckon it among the normal hæmic constituents, but any one, as I have done, can verify Bernard's statement for himself by following his process. I went to a slaughter-house, caught fresh sheep's blood in a vessel containing a little acetic acid—added to a portion an equal weight of sulphate of soda—boiled over a spirit lamp—filtered—procuring a colorless watery liquid, the serum of the blood, and adding it to Fehling's solution in a state of ebullition got the characteristic reddish or yellowish deposit. Bernard declares that the failure to discover sugar has been due to leaving the blood without the addition of acid, to stand for twenty-four hours before testing it, in which time all the sugar will have disappeared. It is, therefore, intrinsically no pathological product—but when it reaches to about the proportion of three grammes it overflows in the urine, constituting diabetes.

He found that, in the intra uterine state, diabetes is

a physiological condition—sugar existing in the urine and in the limiting tissues, (skin and mucous membranes) before the liver is prepared to take on its permanent character as a producer of glycogen. As to the question whether a small quantity of sugar is normally present in the urine after birth, he does not express himself confidently.

Bernard substituted the term *saccharose* for that of *cane* or *beet sugar*, and showed that this substance could never be assimilated unless it first assumed the shape of *glycose* and *levulose*, which it could only do by passing through the small intestines and meeting there the peculiar ferment furnished by the glands of *Lieberkühn*, and which he calls the *invertive ferment*. He proved *saccharose* to be unassimilable—a foreign body if introduced into the organism in any manner which did not involve its passage through the small intestines. Only in this way can it be made *glycose*, and so *glycogen*. For instance, when he ingested *saccharose* into the digestive tube of a rabbit it disappeared as such, but when he injected it into the veins or under the skin it came out in the urine unchanged, and could only be discovered by boiling the urine with a little added sulphuric acid, which converted the *saccharose* into *glycosé*.

He was the first to produce artificial diabetes by pricking with a needle the floor of the fourth ventricle between the origins of the *pneumogastric* and *auditory nerves*. He also produced the same state by *woorara* poison, which paralyses the voluntary muscles—by *morphine*, by *anæsthetics*, &c.

He concludes his book with these words, “At this day innumerable facts are accumulating from all quarters, works are appearing on the question of the origin of gly-

cogenic matter, but they are apparently contradictory, and the authors who wish to review science on this subject are obliged to gather together by artificial views a crowd of notions and facts, often discordant and incompatible, although emanating from a source equally worthy of respect. Such is the present state of the question; we cannot give a theory of diabetes which shall be complete, although the time is doubtless approaching, considering the activity of laborers in this part of the field of service. What is needed now, is a severe experimental physiological criticism, for physiology must here throw light on pathology; without this indispensable criticism of physiological facts, we shall remain always in the same hypothetical circle without making any progress." He concludes his last lesson, the last he was destined to publish, in these additional words: "I can then only close by indicating the direction these labors ought to take; a direction I shall myself follow, in continuance of the experimental critical studies which I have commenced on this subject."

PATHOLOGY.

Dr. W. Howship Dickinson, one of the latest and most respected writers on the subject, finds the brain diseased in very many cases. He gives examples of glycosuria the result of injury to the brain from violence, from the growth of tumors, from hemiplegia, etc. He extended his inquiries so far as to include the inmates of insane asylums, and discovered there, if not diabetes, at least what he considered as evidence of more than a normal amount of sugar in the urine. He gives the results of the examination of the urine in 106 insane persons, inmates of Bethlem Hos-

pital, concluding that a trace of sugar was discoverable if the urine discharged the color of half its bulk of Fehling's solution; a decided reduction if it decolorized its own bulk, and a considerable reduction if it decolorized more than its own bulk. "Of the 106 specimens examined, 47 reduced copper in one or other degree; 29 to the smallest extent noticed; 18 more largely, in 3 of which the reaction was such as to indicate a considerable amount of sugar. * * * In no instance was the sugar so abundant as to give obvious diabetic characters to the urine or to the symptoms."

Dr. Dickinson describes and figures in his book, changes which he found in the brain of diabetics with such constancy as to lead him to believe they were pathognomic. They consisted in excavations and pores especially in connection with the cerebral arteries; cavities due to absorption or destruction of nervous matter along the course of these vessels, and following the escape of their contents.

He discusses the question whether these changes are the cause or the result of the diabetes, and concludes in favor of the first hypothesis. He further thus expresses himself: "As the brain is the agent, the liver is the instrument of glycosuria. The brain misguides the liver, the liver misappropriates the nutriment." Accordingly he finds changes also in the liver concurrent with altered or excessive function. Prout, Andral, Trousseau and Wilks are quoted as having observed these changes; described, as in some instances, a gorged condition of the veins terminating in the Portal system; in others, hyperæmia; again hypertrophic cirrhosis; again a deep color and firmer consistence than natural. Dickinson refers to 27 cases in the records of St.

George's Hospital, where the details of autopsies are given, in which the condition of the liver is noted. This organ, he says, "was natural in 6 only. In 13, various degrees of congestion were noted, sometimes without obvious change, beyond superabundance of blood; sometimes associated with increase of bulk, hardness of tissue, or fatty change. In one instance the hyperæmia was shared by the veins of the omentum and mesentery; in another it had given rise to extravasations in the glandular tissue; in two it was accompanied with coagulation which had taken place during life, chiefly in the Portal channels of the organ; and in an exceptional instance there existed remarkable patches of capillary dilatation. * * The peculiarity of the diabetic liver may be generally summed up as an increase of blood, and such changes in its tissue as chronic hyperæmia induces; enlargement, hardness, and overgrowth of epithelium and fibrous tissue. The alterations in this organ are such as consort with the view that it is not primarily affected in this disease, but that it is modified by an over activity of circulation and function which is instigated by influences external to itself."

In the course of the disease the lungs often give way, being found in a state of caseation, and excavation, differing from ordinary tubercle, but having the same physical signs; dullness on precussion, bronchial and cavernous respiration, etc., and being the immediate cause of the fatal issue. The condition of the kidneys must not be overlooked. Of course changes must be expected there, in view of the enormous overwork to which they are subjected. Dickinson mentions enlargement and congestion; within the tubes overgrowth and fatty impregnation of the epithelium;

fatty degeneration of the gland ; undue softness, sometimes similar hardness. He remarks the preponderance of congestion and sub-inflammatory changes. "The albuminuria of long standing diabetes gives evidence during life of the morbid stimulation which the disease brings to bear on the kidneys." In this connection may be mentioned the case of the late Prof. Crosby, of the Bellevue Hospital Medical College, who died after a very brief illness from diabetes. Indeed, he lived scarce a week after the discovery of sugar in the urine, and the mode of death was by *coma*. Dr. Peaslee, who, alas ! was soon to follow his friend, describes in the *Boston Medical and Surgical Journal* September 27th, 1877, the post-mortem changes as follows :

"Brain decidedly anæmic; no softening except slightly in left hippocampus major; but decided scleroma of the whole substance of the pons and medulla oblongata, and consequently the walls of the fourth ventricle; there was also a body as large as a common pin head, apparently an embolus of long standing, at the point of division of the basilar artery into the posterior portion of the circle of Willis, which must have presented some obstruction to the cerebral circulation. Kidneys most diseased; one so pulpy as to be ruptured in its removal. Under the microscope, an excessive fatty and granular degeneration of the tubular epithelium, parenchymatous nephritis: malpighian bodies granular; on section through the bases of the pyramids, a number of hyaline casts." Dr. Peaslee attributes the disorganization of the kidneys to the powerfully irritating effects of a urine charged to the extent of seven per cent. with sugar. Coincidentally with the copious diuresis which led Dr. Crosby to fear that he

had diabetes, was a defective and diplopic vision which set in with the disease. Here the brain would seem to have been first at fault. The case is, in its rapidity, almost paralleled by one reported by Dickinson, which terminated fatally in twelve days after the first observation of anything wrong. The patient had been apparently in vigorous health up to that time, having just run a race at college. The suggestion is offered that it was a case of mild diabetes of long standing, so mild as not to be suspected in the least. Dr. Crosby, too, may have had slight glycosuria for some time before his apprehensions were aroused, and my own observations favor the supposition that such slight and incipient cases are of frequent occurrence and are often overlooked.

Of late one other organ, the pancreas, has been accused of sharing in the causality of diabetes. In the number of *La France Medicale* for November 17, 1877, under the heading of "*Lesion du pancreas dans certaines formes du diabete*," it is announced that M. Lancereaux submitted to the Academie de Medicine, pathological specimens showing profound lesions of the pancreas, in subjects who had succumbed in consequence of diabetes, and read observations which he followed up with remarks on the pathology of the disease, and with an analysis of similar facts in science. He said, "The observations and specimens which we have the honor to present to the Academy, show that saccharine diabetes is, in some cases at least, accompanied by a grave alteration of the pancreas. Such an alteration has often been met with in cases of diabetes, and in such cases as in these the disease, which was rapidly fatal, was characterized by polyphagia, polydipsia, great emaciation, abundant glycosuria, in a word, by all the signs

of wasting diabetes. On the other hand, animals in whom the pancreas has been extirpated, or destroyed, become voracious, grow thin, and die speedily. Now, considering the special characteristics of diabetes in cases of alteration of the pancreas, and also the phenomena observed in animals after the destruction of that organ, we have a right to conclude that there exists a causal relation between the serious alterations of the pancreas, and the diabetes in question. This form of diabetes would be distinguished by a relatively sudden emaciation, with polyphagia and polydipsia, and peculiar characteristics of the alvine evacuation. The prognosis in this class of cases is the worst possible. The therapeutic indications would consist in suppressing the alimentary substances which are digested by the pancreatic juice, and in supporting the patient with aliments whose digestion is wholly accomplished in the stomach." This would mean, of course, that fats as well as starchy and saccharine food should be avoided in this form of diabetes, as these are the substances especially acted on by the pancreatic juice; and yet how can emaciation be remedied without their employment, ineffectual as it unhappily may be?

DIAGNOSIS.

The diagnosis of simple glycosuria when existing in a mild form might be difficult, as few symptoms would be present to reveal it. Indeed it is asserted by Loebisch (*Anleitung zur Harns Analyse*, Wein—1878) that sugar exists in *normal* urine in about the proportion of 1.5 grs. to the whole amount passed in twenty-four hours; or, supposing that to be fifty ounces, $\frac{1}{15}$ of a grain to the ounce.*

*NOTE—Since this paper was read, I have seen in the June number of the *London Lancet*, the initial lecture of a course by Dr. Pavy, "On some points connected

If this is so, there may even be a normal glycosuria, but it would be undiscoverable by the ordinary tests, and would have of course no clinical significance, and would be unaccompanied by symptoms to point it out. The moment, however it reaches so far as to be perceived by means of Fehling's solution, it should be considered unnatural and should receive earnest attention, as at that stage it is easily remediable by a simple regulation of the diet.

Glycosuria is a term including the specific term diabetes mellitus, just as albuminuria is a term which in-

with Diabetes," in which he maintains the constant presence of a small portion of glucose in healthy urine. I extract the following:

		Sugar in 1000 parts.	Grains pr. oz.
Urine from healthy person, giving no reaction when			
tested ordinarily,	- - - - -	0.276	.122
Do.	do. - - - - -	0.206	.191
Do.	do. - - - - -	0.096	.0426
Urine from patient with tubercular meningitis,	-	0.232	.103
Urine from phthisical patient giving trace of re-action,			
tested ordinarily,	- - - - -	0.433	.193
Urine from Dyspeptic patient, very slight reaction,			
tested ordinarily,	- - - - -	0.533	.291
Urine passed after the administration of chloroform ;			
decided reduction of copper solution, tested			
ordinarily,	- - - - -	1.429	.65

This is his mode of experiment :

To 4 ounces of urine add one ounce of a saturated solution of neutral acetate of lead.

This throws down the phosphates, chlorides, uric acid and urates—but leaves the sugar still in solution.

Filter, and to the filtrate add ammonia, which throws down a precipitate consisting of lead and sugar, 3 parts of the former and 2 of the latter.

This precipitate is collected and washed and decanted repeatedly to get rid of the ammonia—and with a slight addition of distilled water is subjected to the action of sulphureted hydrogen, which throws down a sulphide of lead, and leaves the sugar in solution. Filter, reduce to one-third in a water bath—get rid of the sulphureted hydrogen, and treat with Fehling's solution in the ordinary way. I have myself found traces of sugar in healthy urine by this process.

cludes the fatal Bright's Disease. And just as the simple occurrence of albumen in the urine does not warrant the physician in relegating the case at once to the more serious category—so, a slight quantity of sugar, even though recognizable by Fehling's test, would not constitute confirmed diabetes. So, too, as simple congestion of the kidney, marked by the presence in the urine of albumen and casts of the uriniferous tubules, is susceptible of cure, as we see daily in the cases of scarlatinal dropsy, and the albuminuria of pregnancy, in like manner that condition of the assimilation which is indicated by the escape of a small quantity of glycose by the kidneys, is quite amenable to treatment—may be a mere passing and temporary state, and hardly merit the name of a disease. But more of this hereafter.

The most striking symptom, and that which especially arrested the attention of the ancient physicians, is the enormous quantity of urine passed. In connection with this there is extreme emaciation, which, as we have seen, the ancients also noted. Another point they did not fail to take in was, that the disease is an apyretic one—and marked by a reduction instead of an increase of temperature. Of course the thirst, and augmented appetite could not escape their observation; but it is the presence of sugar in marked quantity which constitutes the disease, and this, as we have seen, they overlooked. The force of the disease seems directly proportioned to the amount of sugar excreted, and also to the amount of urine, which is graduated by the quantity of liquids taken, though the sugar may exist in pathological quantity with little or no increase in the quantity of urine passed.

There is a form of polyuria called diabetes insipi-

dus, in which little or no sugar is found by Fehling's test, and where the specific gravity, invariably above 1020 in true diabetes, is much below that level. Some times this condition is accompanied by paroxysms of hysteria. Such a case has lately been under my care, in which five pints of urine were passed in five hours, and where a trace of sugar was recognized by means of the ordinary test—specific gravity, 1005. This illustrates the proteiform nature of hysteria, and would suggest attention to the nervous system as the part especially involved in diabetes.

In another case of profuse urination in a lady fifty years old, suffering from nervous symptoms, though without globus hystericus, the patient alleges that her state is congenital. The specific gravity here too is 1005, and no sugar. In the first of these cases the amount of sugar was not enough to reduce the specific gravity on the addition of yeast. The urea was very little to the ounce, being but 3.09 grs. Next day's urine showed a specific gravity of 1013, with two quarts in twenty-four hours and a subsidence of the hysteria—urea, 4.76 grs., about half the average, which is put by Piffard at eight grains.*

Emaciation, which was also remarked by the ancients, is often wanting—though such cases generally excrete but a moderate amount of sugar. But Mrs. W., a lady who first consulted me nearly ten years ago, still remains plump, though a specimen of her urine, taken April 16, showed a specific gravity of 1040—and contained 35 grains of sugar per ounce.

A great many diabetics are large and fleshy. When

* NOTE.—Prof. Bedford, (N. Y. College of Pharmacy) says, that he knows a man who for 6 years past has made 9 gallons of urine a day, and now passes $1\frac{1}{2}$ gallons; and during the whole time has been out to business uninterruptedly.

they are so, the prognosis is considered better than in the case of thin subjects.

In these latter, the diagnosis has to be extended to pulmonary phthisis, as mentioned previously. There is a form of consumption which Dickinson calls caseation of the lungs, differing from tubercle, but accompanied by excavation and having the same fatal issue. I have met with but one such case. It is that of a lady, a widow of middle age, whom I see by the courtesy of Dr. Smith, of Irvington, her physician. She has been suffering from diabetes for the last three years. A specimen of her urine contained 6 grs. of sugar, and 3.088 grains of urea. The right lung is extensively diseased, there being a large cavity and marked dullness over the whole upper third. But the original disease was diabetes, and the lung complication is secondary. There is in this case also considerable embonpoint remaining. The emaciation would be much more pronounced if the lung had suffered primarily, and from ordinary tubercle. By this time she would have been a mere skeleton.

Glycosuria would scarcely be confounded with the cases of slight saccharinity of the urine occurring in lying-in and nursing women, and sometimes in acute or chronic albuminuria. Since making inquiries on this subject, I have encountered sugar in three cases of nursing women, though not in sufficient quantity to be estimated. This, of course, can scarcely be considered pathological. As to the concomitance of glycosuria with albuminuria, I have met with it twice.

M., a male child, three years old, had scarlet fever recently, which was followed by dropsy and albuminuric convulsions. The urine of May 8th, previously freed from albumen, and then tried with Fehling's test, showed a trace of sugar.

M. C., sixty years old, has enlargement of the heart, atheroma of the radial artery and general anasarca. When the urine was cleared of albumen by boiling with sulphate of soda and filtering, (which precipitates the urates as well as the albumen,) a little of it added to Fehling's solution caused a slight deposit of a yellow cast, showing sugar; specific gravity 1009, and no change by the addition of yeast.

Diabetes is usually accompanied by dryness and huskiness of the skin; indeed, it is usually difficult to induce perspiration. But examples are not wanting where this diagnostic feature is replaced by its opposite—profuse sweating on slight exertion. Such is the case with a lady whose urine was lately brought me for examination by Mrs. Dr. Allen, in which the sugar showed to the amount of 23 grs. per oz.

As might be anticipated, the undue saccharinity of the blood produces some cutaneous irritation. The presence of the disease in the case of a lady was signalized by universal nettle-rash. It will be observed that a like phenomenon accompanies the circulation in the blood, of the biliary acids.

Constipation, which is almost invariably a feature of the disease, may be replaced by diarrhœa. The case just alluded to is one in point—diarrhœa here has long been present. There is also in diabetes of considerable severity, sponginess of the gums and recession of them from the teeth, which thus become loosened. This is often accompanied by offensive breath. Very generally patients complain of distress about the epigastric region, and in the neighborhood of the liver. Vertigo is a common accompaniment of diabetes—one patient had to sustain herself by the bedstead to avoid falling, on getting up in the morn-

ing. In several instances patients have suffered from severe cramps in the legs. Rosenstein (quoted in the miscellany of the *N. Y. Med. Journal*, July, 1877,) remarks on the combination with glycosuria, of sciatica, limited to the peroneal and tibial nerves, and thinks both diseases due to a hyperemic condition of the abdominal organs. He says that treatment which diminishes the hyperemia, relieves them equally, while the customary treatment of sciatica is ineffectual. The prognosis in such cases he considers favorable. He recommends a close scrutiny for sugar in all cases of sciatica limited to the peripheral portions of the sciatic nerve. One of my patients, complained more particularly, of severe darting and boring pains under the finger and toe nails.

There is another diagnostic mark not to be omitted. When the urine is loaded with sugar it has an irritating quality, which produces soreness, heat and itching about the vulva and the orifice of the urethra. Sometimes a discharge issues from the latter of a purulent character. If the secretions are subjected to microscopic examination the spores of *penicillium glaucum* are recognized. Dr. Niepece, Jr., considers balanoposthitis a valuable diagnostic sign, and he is surprised that its importance should have remained so long unappreciated. He thinks phymosis occurring suddenly and spontaneously may indicate diabetes, and is often the only sign apparent. Three of my patients are affected with the irritation spoken of. In one, an elderly lady, the smarting of the labia demands cooling lotions, and corresponds in severity with the varying amount of sugar in the urine. In the second case, also that of a lady, suffering from diabetes, but with phthisical complications, as the

latter have become more aggravated, the sugar has diminished and with it the local affection. In the third case, that of a young man whose urine persistently contains 40 grs. of sugar, there is a constant purulent discharge.

Of course, intense thirst, and a ravenous appetite are, as the ancients noticed, very prominent features—but the latter may even give place to anorexia—as I have seen in the case of the two ladies above alluded to.

Another diagnostic mark is a high specific gravity ; but this, while attracting attention, would not necessarily indicate a saccharine quality, nor would a low specific gravity absolutely exclude it. In a patient who had, with a large per centage of sugar, a specific gravity of 1050, the latter kept above 1030, after every trace of sugar had disappeared. Here, however, the urea was in quantity sometimes as high as 17 grs. pr. oz. after the sugar was gone.

A sequæ of diabetes not to be overlooked is cataract. This has been produced artificially in frogs by injecting glycose under the skin. Whenever present, sugar should be sought for in the urine.

Finally, virility is more or less affected and at last generally completely destroyed in this disease.

But to sum up—the only really invariable diagnostic is of course the existence of sugar persistently in the urine.

TESTS.

The tests for this are various, but the one most relied on is the cupro-sodic or Fehling's, made as follows, according to Flint in his little treatise on the urine. Its action is due to the fact that the salt of copper is reduced by heat in the presence of glycose

and alkalies, so that a suboxide of copper is produced and precipitated in the form of an opaque red or yellow powder. "Sulphate of copper, 94.73 grains (40 grammes); neutral tartrate of potash, 378.91 grs. (160 grammes); solution of caustic soda, specific gravity, 1.12 (about $16\frac{1}{2}^{\circ}$ of Baumé's hydrometer), $3\frac{1}{2}$ fluid ounces (750 grammes). Add water to make exactly 6 fluid ounces (1154.5 cubic centimetres). If prepared by the English weights, exactly 200 grains of the test-liquid will correspond to one grain of sugar. If prepared by the French weights, ten cubic centimetres correspond to 0.05 of a gramme of sugar. For merely determining the presence or absence of sugar in any given specimen of urine, an ordinary test-tube is filled to the depth of about an inch with the test-liquid, which is boiled, when the urine is added drop by drop. In ordinary diabetic urine, the first few drops will produce a brilliant reddish or yellowish opaque precipitate. If the urine be added to about the volume of the test-liquid, and the mixture be again brought to the boiling point, without any precipitate, it is certain that no sugar is present."

I may add that a mere flocculent precipitate does not indicate sugar—it may be due to phosphates. But if it is opalescent and opaque it is a sure sign.

Piffard recommends the following as a convenient test. It is in a solid form like a pill mass, and is used by dropping into the urine a small bit half as large as a pea and bringing to the boiling point:

R. Caustic soda 2 parts, sulpt. copper 1 part, Rochelle salts 5 parts.

For quantitative analysis I have proceeded thus: Dilute the urine already ascertained to be diabetic with nine parts of distilled water. Then to 30 minims

of Fehling's liquid in a state of ebullition, add ten minims of the diluted urine; wait for the precipitate to subside, and if the blue color is not discharged, add as much more, so continuing till no trace of blue remains. The bottom of the test-tube will be covered with the red suboxyde of copper. Suppose 20 minims of the diluted urine have been used for complete discolorization. Then 2 minims of the pure urine have balanced 30 minims of the solution, of which 200 will be the equivalent of one grain of glycese. Then, as $30:2::200:13\frac{1}{3}$, or $13\frac{1}{3}$ minims of urine contain one grain of sugar; and one ounce, or 460 minims, will contain $34\frac{1}{2}$ grains.

Barreswil's solution is much the same as Fehling's, with potash substituted for soda; and both are but modifications of the old Trommer's test. If albumen be present, it must first be precipitated and removed by filtration.

Böttger's test for sugar consists in adding to the urine first of all potash (or soda), then a small quantity of subnitrate of bismuth, after which the mixture is boiled. If sugar be present, the oxide is reduced to metallic bismuth, which is precipitated in the form of a black powder. Albumen which likewise blackens bismuth, must first be removed if present.

Maumené's test: a little woolen rag, white merino, is cut into strips, and soaked a few minutes in a solution of perchloride of tin—one part of the perchloride to two parts of water. The slips are dried, and a drop of the urine allowed to fall on one of them; after which it is exposed to the heat of a spirit flame. The presence of sugar is shown by a black spot.

Chromate of potash test: Equal parts of neutral chromate of potash and solution of potash are boiled

with the urine, when if sugar is present, a green color is produced, owing to the oxide of chromium. A modification of this is to decompose a solution of bi-chromate of potash by excess of sulphuric acid, and boil the saccharine urine with it, when a bright green color results. This reaction is said not to be affected by urea, albumen or the urates. I ought to mention among the tests of this character, the oldest of all—viz.: Moore's, which consists simply of equal parts of urine and liquor potassae boiled together, when, if there is glycose, the color will change to a brown or bistre hue, more or less deep according to the percentage of sugar. This is due to the formation of melassic acid.

Bouchardat recommends patients to test their own urine every few days, boiling it along with a bit of quick lime, when, if it contains sugar, both the urine and the lime will be made yellow. Both these are coarse tests, and only useful when the sugar reaches at least the amount of two grains to the ounce.

Besides these color tests, there is that by fermentation, which I cannot do better than describe in Beale's words: "Two test-tubes, of the same form and of equal size, are to be taken. One is nearly filled with water, and into the other a corresponding quantity of the urine is to be poured. An equal amount of yeast is now to be added to the liquids in the tubes, and after pouring in just sufficient fluid to fill the tubes, the thumb is to be carefully placed over the opening and the tube inverted in a small cup of mercury."

The plan which I have found most convenient is the following: A little India-rubber pad, slightly larger than the upper extremity of the tube, is to be cut out of a sheet of India-rubber. When the tubes have

been filled up to the brim with a little water, the pad is allowed to float on the surface; next a little cup or beaker is inverted and carefully placed over the end of the tube. The India-rubber being pressed against the open end, the fluid is prevented from escaping. The whole may be inverted, and a little mercury having been poured into the beaker, the India-rubber may be removed with forceps, without any escape of the fluid. The tubes may be supported in position by a wire stand. Both tubes are then to be exposed, for a few hours, to a temperature of from 80° to 90° , and the comparative size of the bubble of gas in the upper part of each may then be noted. If an appreciable quantity of sugar be present, the bubble of gas in the tube containing the urine will be many times larger than that in the tube which contains the yeast and water. In the latter tube the bubble of gas merely arises from the small quantities of air previously mixed with the yeast becoming disengaged and floating to the surface. Fermentation, when carefully performed, is positive evidence of the presence of sugar, although it does not indicate the kind of sugar present." (It should be remembered that it fails to act on lactose.)

"The carbonic acid can be detected in the fermented liquid by potash. A fragment of potash is placed in the tube, and the end immediately closed with the thumb. If carbonic acid be present, it is soon absorbed by the potash, and upon the closed end being placed under the surface of water, and the thumb removed, a quantity of water will rise in the tube equal to the volume of carbonic acid absorbed."

In doing this as a quantitative test, a graduated tube must be used. "When the fermentation is completed, the volume of gas is to be read off, and, after correc-

tion for temperature and pressure, (Miller's Elements of Chemistry, vol. I,) the amount of sugar calculated. One grain of sugar corresponds to nearly one cubic inch of carbonic acid."

Another way of using the fermentation test, is to take two vials each containing two or more ounces of the urine to be examined, and add yeast to one of the specimens, fitting a grooved cork to the vial. Put both specimens away for twenty-four hours in a warm place, and then try the specific gravity of each. The fermented urine will show a loss of specific gravity equalling the number of grains of sugar per oz. used up in the fermentation. For example: if in the unfermented urine the urinometer sinks to 40, while in the other it stands at 10, this indicates that the urine contains 30 grains of sugar per ounce. Another test is by the polariscope, but the instrument is costly, and the test is not so delicate as some which I have already described.

With these tests we have ascertained the presence and amount of glycose. Now, what is the prognosis? Formerly this was uniformly very grave; and even now some authors doubt whether complete recovery ever takes place. But they are certainly in error, as some of my own cases would seem to indicate. It is still a serious question however, whether after apparent recovery the patient should be allowed to abandon the restrictive diet, which, as we shall see, is his principal resource as a curative agent. At least, it will be the part of prudence to return to the ordinary diet only by degrees, and to introduce starchy and saccharine articles into it but sparingly; always, at intervals, testing the urine by Bouchardat's method, or preferably by Fehling's solution, which of course the patient, duly impressed with the serious nature of his disease, may be left to do.

TREATMENT.

As already intimated, this consists mainly in a suitable diet and hygiene. With these alone in the milder cases, and even sometimes in the severer, the urine becomes free from even a trace of glycese—and without them no medicinal treatment whatever will avail anything. Here are the diet lists of Drs. Pavy and Dickinson with which, in the main, M. Bouchardat's coincides. The latter includes among prohibited articles, though probably with no sufficient warrant, soda and other gaseous waters, and agrees with Dr. Pavy but not Dr. Dickinson, in inserting milk in the list, as I think, equally without good reason.

Certainly, so far as my observation has gone, milk seems to have been a most precious resource. Dr. Donkin, of England, relies on skimmed milk as his principal remedy, though why *skimmed* I cannot conjecture. One of my patients after the disappearance of sugar from his urine, drank, by my advice, large quantities of milk, without a trace of sugar showing itself. He was also in the habit of indulging in sweet cream and soda water, not only without injury, but with manifest increase of fat.

M. Bouchardat's list is too long to quote. He expatiates at large, as befits his nation, and *a la chef de cuisine*, on the proper menu for diabetics—but all is summed up, as by his English confreres, in a rigid exclusion of saccharine and starchy food—but as to starch not so rigid—for he recommends gluten flour, which contains a certain proportion of starch. I have ascertained this to be the case with the flour that goes by that name, and is sold by Shedden & Co., corner of Broadway and 34th street, N. Y.

DR. PAVY'S AND DR. DICKINSON'S DIET LIST FOR DIABETICS.

WHAT TO EAT.	WHAT TO DRINK.	WHAT TO AVOID.
<p>Fresh meat abundantly, without exclusion.</p> <p>Meat, salted, smoked, cured, pickled or preserved, in any way except with honey or sugar.</p> <p>Poultry and game of every kind.</p> <p>Fish of every kind, fresh and preserved.</p> <p>Soup of all kinds, made without common flour, or prohibited vegetables.</p> <p>Unsweetened jelly, isinglass, oil, dripping and suet, butter, cheese, cream, cheese, curds.</p> <p>Cooked green vegetables, cabbage, cauliflower, spinach, broccoli, Brussels sprouts, turnip tops, French beans, the green ends of asparagus.</p> <p>Uncooked green herbs, lettuce, water cresses, mustard and cress.</p> <p>Gluten flour and bread.</p> <p>Rye flour and cakes.</p> <p>Almonds, nuts and filberts.</p> <p>Walnuts, Brazil nuts, cocoa nuts.</p> <p>Condiment. Glycerine.</p> <p>(Dr. Pavy excepts liver.)</p> <p>Shell-fish of all kinds.</p> <p>Animal waste and thickened.</p> <p>Beef-tea and broth.</p> <p>Eggs dressed in any way.</p> <p>Turnips,* seabads,* vegetables, marrow,* mushrooms, cucumber, endives, radishes, celery, rhubarb, oil, pickles, starchy jelly, slices.</p> <p>Blanc mangé, made with cream without milk.</p> <p>Mustard made without sugar.</p> <p>All nuts, except chestnuts.</p> <p>Those marked thus * in moderation.</p>	<p>Water, soda, seltzer and all mineral waters.</p> <p>Tea, coffee, and cocoa from the nibs.</p> <p>All unsweetened spirits, cognac, whiskey, Dutch Holland.</p> <p>Unsweetened gin, rum.</p> <p>Claret, red Burgundy, white Burgundy.</p> <p>Chablis and Graves, Hock, and still Moselle.</p> <p>The driest pale sherry.</p> <p>Amontillado or Vin de Paste.</p> <p><i>Dry Sauterne.</i></p> <p>Brandy and unsweetened spirits.</p> <p>Soda Water. <i>Porton bitter ale in moderate quantity.</i></p>	<p>Sugar, treacle, honey.</p> <p>Common flour, bread.</p> <p>Macaroni and vermicelli.</p> <p>Corn flour, arrow-root, sago, tapioca, oat-meal, barley-meal, potatoes, beet root, parsnips, carrots, turnips, radishes, onions, and all roots.</p> <p>Celery, sea-kale, rhubarb.</p> <p>Peas and beans.</p> <p>Chestnuts.</p> <p>All sweet and preserved fruits.</p> <p>Milk,* whey, skimmed milk.</p> <p>Chocolate.</p> <p>All malt liquors with the specified exceptions.</p> <p>Cider, champagne, and all sparkling wines.</p> <p>Port, Madeira, and all sweet wines.</p> <p>Sherry, except the driest.</p> <p>Sweetened spirits.</p> <p>Liquors.</p> <p><i>Rice, Spanish onions.</i></p> <p><i>Pasty and puddings of all kinds.</i></p> <p><i>Fruits of all kinds, fresh and preserved.</i></p> <p><i>Sweet ales, mild and old porter and stout.</i></p> <p><i>All sweet wines, sparkling wines.</i></p> <p><i>Port wine, unless sparkling.</i></p>

MODIFIED. (W. H. D.)

Add: Bitter ale.
Add: Milk.

Add: Toasted Bread.
Add: Celery and sea-kale.

NOTE.—The Roman is the Dietary of Dr. Wm. H. Dickenson, and the *Italic*, that of Dr. Frederick Wm. Pavy.

(October 1877.)

M. Bouchardat also accompanies his diet list with these excellent precepts :

“ Eat slowly and in moderation, chewing and masticating the food well.

So long as the urine passed in twenty-four hours exceeds three pints, drink as little as possible.

But little liquid food, such as soups, broths, etc.

Drink small mouthfulls ; you can rinse the mouth with ice-water ; if you swallow it, you must especially observe the rule of small mouthfuls.

Combat the feeling of thirst, by chewing cocoa beans roasted, burnt coffee beans, or olives.

Two meals a day are better than three or four ; one at 10 o'clock, the other at 6.

Avoid resting, especially sleeping after meals ; for this purpose a good walk, on rising from the table is very suitable.

Go to bed four or five hours after the last meal.

Abstain from tobacco, or smoke as little as possible.”

My own dietary for diabetics would not include any alcoholic drinks, whether containing sugar or not. If the liver be at fault, and it certainly is involved in most cases, alcohol would be contra-indicated, as no other agent has so much to do with producing disorganization of that viscus. At all events, it would seem to be entirely unnecessary ; and I wonder M. Bouchardat did not interdict it along with that other, though less noxious article, tobacco. I may mention that I have tried for the last three months, in my capacity as surgeon to the New Jersey Home for Disabled Soldiers, the effect of treating the invalids there without alcohol, and am more than satisfied with the result. Alcohol has been the bane of many of these men, and one of the effects of administering it to them even as

medicine, was to keep up, even in some instances to revive, a morbid appetite.

With regard to incontestable foods, with milk, cheese, cream, eggs, tea, coffee, cocoa nibs, or Menier's cocoa without starch or sugar, all sorts of meats and fish, and green vegetables, as lettuce, spinach, water cress, cabbage, along with starchless flour, I cannot see what the invalid has to complain of unless he is a veritable Sybarite, and finds pies and puddings things without which life is undesirable.

Besides diet, the most important hygienic precepts in this disease by common consent are those which enjoin active exercise, frequent ablutions, including sea baths in their season, and a cheerful mind, avoiding carefully all angry excitement; and M. Bouchardat especially cautions against venereal excesses, remarking that impotence does not alway characterize the disease, even when severe. He gives two cases in illustration, and remarks; "These two very conclusive observations assist in demonstrating to me two facts. The first, whose accuracy I have had frequent occasion to verify, is that the excitement which follows venereal improprieties favors glycosuria; the second, that these unlicensed abuses oppose the re-establishment of health, and contribute to an unfortunate issue. I should add, nevertheless, that I have seen several diabetics remain virile, in spite of the presence of glycose in their urine, and live for years with every appearance of health; but I have always noticed that venereal excesses increased in them the production of glycose."

MEDICINAL TREATMENT.

No disease has a greater list of remedies to show, drawn from the *materia medica*; which proves that not one of them is of certain value, though some are vaunted as almost specific. Opium seems to have the

most suffrages, but Dickinson doubts if it have not killed more than it cured. Pavy's favorite is codeia, one of its constituents, which he administers in doses gradually increased from $\frac{1}{4}$ grain to 2 grains, three times a day; while Bouchardat falls back on that wonderfully complicated compound known to the ancients as *theriac*, with its fifty or sixty ingredients, the principal one being opium. Aetius had used it in such cases.

The drug next in importance is strychnia, and here is a formula given recently by Dr. Dickinson to a patient, an American gentleman who called on him:

R	Liq. Strychniæ,	℞xxiv.
	Tr. Ferri Perchlorid,	3ij.
	Acid. Nit. Dil.,	3iss.
	Aquæ,	ad. 3vi.

One tablespoonful in water to be taken twice a day.

Another remedy universally recommended is the class of alkalis. M. Bouchardat praises especially the carbonate of ammonia. One of his formulas is this:

R	Carb. of ammonia,	1 to 5 grammes (15 to 75 grs.)
	Rum,	20 " (310 grs.)
	Water,	100 " (1,550 grs.)

Taken in three doses, half an hour before meals.

He also prescribes it in a bolus:

R	Carbonate of ammonia.
	Theriac, of each 20 grammes.

Make 40 boluses—two to six every evening on going to bed.

He narrates several cases of apparent cure by this treatment, combined with the use of his gluten bread. Besides ammonia, he prescribes the fixed alkalis, and lime water. He sends his patients to the baths of Vichy, Ems and Carlsbad, all strongly alkaline. In addition, he glances at a variety of other drugs, all however, in subordination to a proper diet and regimen,

the use of fats, abstinence from saccharine and starchy food, deep inspirations, abundant and even forced exercise, and active habits generally; bathing both in fresh and salt water, the latter especially during convalescence, and in short, such a rational mode of life as every one ought to use in order to keep in good health.

Then he mentions, with more or less approbation, electricity, the inhalation of oxygen, and of the peroxide of hydrogen, iodine, cod liver oil, the chalybeates, quinine, and bitter tonics, astringents as alum and nutgalls, evacnants, mercurial, cupric and arsenical compounds, anti-scorbutics, rennet and pepsine, yeast, the alkaline sulphites, parasitocides as koussou and santonine; and, finally, of all things in the world, blood letting! *

Evidently diabetes yet awaits its specific, if there be such a thing; perhaps its quinine will be forthcoming some day, but diet and regimen is the nearest approach to it up to our time.

Dickinson increases the list by the addition of chloral and lactic acid; and others have of late used carbolic and salicylic acids with alleged benefit.

Far superior in efficacy to all these drugs is the Camplin biscuit, which takes its name from an English physician who himself suffered from diabetes, and was led to invent a flour made from bran from which all starch was carefully removed. He undoubtedly prolonged his life for several years by its use, and since his time many others have borne testimony in its favor.

The only place I know of where the Camplin flour can be procured, is at Shedden's pharmacy, where it

*NOTE.—Diabetes Insipidus has been treated successfully with large doses of valerian. M. Rendu, in a recent number of *La France Medicale*, recommends ergot in dose of $\frac{1}{2}$ a gramme to a gramme of the powder. Both of these remedies are addressed to the nervous system. The latter has the property of contracting the blood vessels—the arterial capillaries.

is sold in cans containing 10 lbs. for \$5, or in packages of 12 ounces at 50 cents each.

Directions accompany the flour as to the best mode of using it. It is made into cakes with milk, butter and eggs. I think the biscuits are improved by using less butter and eggs than prescribed. They are less rich and cloying.*

The remainder of this paper shall be devoted to a brief abstract of cases which have occurred under my own observation ; or for the particulars of which, in a few instances, I have been indebted to the courtesy of professional brethren. I will also give details of several of the more interesting. They number twenty-two in a developed and several others in an early and mild state, of which, however, I preserve notes of but a part. Of these, eleven are dead, the fate of one is unknown, ten are still living ; sixteen were males and six females. Of the dead, three were adolescents, six aged, and two at the middle period of life. Of the others, two belong to the first category, two the second, and seven to the third. The person whose subsequent history is unknown, consulted me some years ago from Paterson, when I found an abundance of glycose in his urine. I put him upon rigid diet, and gave besides, iron with strychnia, and on subsequent occasions testing his urine, found it entirely free from sugar, with a corresponding improvement of health generally. He then ceased to call on me, and for ought I know may be still living. A case not included in the list is that of a corpulent old lady, who suffered so much from vertigo that she could hardly walk.

* NOTE.—A lady gives me this: Take two cupfuls of the flour, two eggs, a piece of butter the size of an egg, and enough milk to make dough of suitable consistence. Make cakes 3 inches in diameter and an inch thick. Bake quickly.

Some of her symptoms pointed to a want of power to assimilate starchy and saccharine food ; there was, I think, fermentation after eating it, and I accordingly put her upon the Camplin flour with the best effects. I have only recently heard from her, and learn that she is surprisingly improved. I am led to suggest the use of Camplin flour to dyspeptics of this sort, whether sugar is ascertained to exist in the urine or not. The biscuit, being made without ferment and containing no fermentable material, would seem to suggest itself as especially indicated. Of those in my list who died, one only had been affected for a term of years, and he was originally noted for embonpoint and a rosy complexion. Of the living, one has suffered from the disease ten, one six, one four, and all the rest under two years. I hear from Mr. G. F. Simpson, of Newark, that an acquaintance of his living at Rosedale, has had the disease eighteen years, and is yet quite fleshy and in tolerable health.

The oldest on the list is a gentleman still living, over eighty, and at present in good health, having evidently recovered from the disease, and been able to resume his usual diet, with the single exception of sugar. The youngest was about nine, and she died after a very brief illness, as is the rule with adolescents, though not without exception.

In the old gentleman alluded to, the glycosuria was preceded by cerebral disturbances, and threatnings of paralysis, which however passed away without result. In another case, also of an old man, paralysis (hemiplegia) appeared two years before death, and some time before the glycosuria was recognized. This case involved litigation, not yet terminated, about testamentary capacity ; and some of the evidence goes to show great impairment of the memory, even failure

to recognize his own relatives, and a mental debility verging on if not merging in actual imbecility. It offers a striking illustration of the statement of Dickinson, who remarks on the physical degeneration which often ensues from diabetes: "the mind deteriorates morally and intellectually. The sufferer becomes drowsy and his wits sluggish. The disease supplies, like advancing age, 'fears to the brave, and follies to the wise.' The strong and resolute character becomes weak and vacillating. The equable temper becomes fretful, irritable and passionate; and the courage and constancy which once opposed a calm front to all the storms of fortune, now yields to a querulous and tearful despondency."

But three of this series are known to have developed albuminuria in the course of their disease. Most writers speak of the frequency of this complication, and doubtless if looked for, it would have been found in more than three cases out of twenty-two. Since my attention has been directed to this subject, I have detected sugar in several cases of albuminuria, as previously mentioned. I have also found it in the albuminous fluids of ascites, of fibro-cystic tumors of the womb, and of hydrocele.

In one case narrated to me by Dr. J. B. Jackson, and included in this series, the patient, an elderly lady, was progressing well under strict diet, when happening to attend a family reunion, she indulged in forbidden articles of food, with the result of producing an immediate aggravation of the disease, and a speedily fatal issue. Two were physicians, and both recovered. These cases were mentioned to me by Dr. Alonzo Clark, of N. Y., who said that one, Dr. —, of Pittsfield, Mass., consulted him, and was found to have diabetes; from which however he completely

recovered, living some ten years longer, and dying at last at the age of seventy.

The other patient would be free from glycosuria as long as he adhered to the Camplin diet, but being a country doctor, and often invited to the hospitable boards of his patrons, he found that indulgence in a mixed diet, containing forbidden articles, was apt to be followed by a recurrence of the disease.

One case is that of a clergyman residing in the vicinity of Montclair, under the professional care of Dr. Whittingham of that place, who gave him a letter to me some months ago. I found a considerable quantity of sugar. The disease was of recent date and had made no serious inroads on his constitution, he being still very muscular, of pronounced vitality, full habit, and of florid complexion. He was put upon the Camplin flour, which I may say incidentally, I have tested and found entirely free from starch, as it purports to be. I advised alkalies; and Dr. Whittingham gave the following prescription, which I have tried in several other cases also with apparent benefit:

R	Potas. bi-carb,	℥i.	
	Sodæ phosphat.	℥iiss.	
	Glycerine,	℥ij.	
	Tr. cardomom co.,	℥ij.	
	Acid salicylic,	℥iiss.	
	Sodæ salicylicat,	℥ij.	
	Aquæ font.	℥iij.	M.

One teaspoonful after each meal.

I saw this gentleman some months subsequently, and he appeared to be entirely well. Dr. W. informs me, that he has used the above formula in the case of another gentleman with an equally happy result; in which case he had substituted the gluten for the bran

flour, without any reappearance of the sugar. In a note addressed to me by the clergyman in question he writes as follows: "I was not dizzy, but had several severe fainting spells—almost coma—no mental aberrations. Copious discharge of urine, one gallon per day; now almost normal—about three pints per day; specific gravity at first, between 30 and 40—now about 25; last test—Trommer's, showed a very little amount. Kept strict diet; weighed in February, March and April of last year, about 165 pounds—now 186 pounds; walk daily from three to five miles; have muscles like iron; had no cramps in legs. Have used, till about three months ago, acid salicyl., potass. bi carb., and sodæ phospt. Since then no medicine, except quinine. Keep diet strictly, also my walk (exercise); was reduced, at height of disease, so much that I could hardly walk. All my clothes had to be made smaller, and now they must be let out again."

If the result in the case of the clergymen is encouraging for persons in middle life, the next case, the record of which was kindly furnished to me by Mr. George F. Simpson, (with Messrs. Smith & Bell, druggists,) with whom the patient, a drug clerk, faithfully and intelligently co-operated, is still more so, as belonging to a class (that of adolescents) the most unpromising of all.

SYNOPSIS OF DIET, TREATMENT, ETC.

History of a case of Diabetes in patient M., aged 20, weight, 158 lbs.; height, 5.10; complexion, dark; previous health good. Disease first made its appearance on or about November 26th. Treatment commenced December 18th. Record, December 22. Loss of weight, December 18th to January 1st, 26 lbs. Gain from January 6th to 25th, 9 lbs.

	DIET—SOLIDS.	LIQUIDS.	URINE.	SP. GRAV.	REMARKS.
1877. Dec. 18				1040	Treatment, pepsin, bi- smuth, sub. nit quinia and podophyl.
19				1043	
21			oz	1047	
22	8 oz. meat, 12 oz bread, 16 oz. veg.	120 oz. water, wine, milk.	10-4	1043	Reac. slightly acid bile, 1 stool normal, sugar, 26 grs. per oz.
23	54 oz. meat, bread, chicken, veg.	122 oz. water, Rhine wine, milk.	125	1044	1 stool, fluid copious.
24	48 oz. crackers, cheese, meat, veg	154 oz. soda, water, milk.	132	1044	Reac. neutral, no stool, sugar 32 grs. per oz.
25	57 oz. cheese, stale bread, meat.	125 oz. soda, wine, milk.	117	1046	Reac. neutral, no stool, sugar 34 grs. per oz.
26	63 oz. cheese, stale bread, meat, veg	94 oz. soda, wine, milk.	131	1050	Reac. acid, no stool, sugar 38 grs. per oz.
27	53 oz. cheese, stale bread, meat, veg.	63 oz. soda, Vichy, milk.	93	1048	Reac. acid, no stool, sugar 36 grs. per oz.
28	51 oz. cheese, stale bread, meat, veg.	92 oz. soda, water, milk.	84	1049	Reac. acid, sugar 37 grs. tinct ferri pro chloride
29	55 oz. cheese, stale bread, meat, fish.	116 oz. soda, water, milk.	102	1048	Reac. acid, urine phos- phatic, bowels consti- pated, much flatulency.
30	46 oz. cheese, stale bread, meat, fish.	126 oz. soda, water, milk.	102	1042	Reac. acid, sugar 30 grs. per oz.
1878. Jan. 1	46 oz. cheese, stale bread, meat, fish.	126 oz. soda, water, milk.	.....	1050	Reac. acid, sugar 38 grs. per oz. 3 stools fluid.
2	76 oz. cheese, stale bread, meat, fish.	56 oz. soda, water, milk.	129	1041	Reac. acid, sugar 36 grs. per oz.
3	74 oz. bread, meat.	82 oz. Vichy, water, milk.	82	1044	Reac. acid.
4	14 oz. cheese, dia- betic flour, meat.	64 oz milk, tea, soda	64	1042	Reac. acid.
5	33 oz. cheese, dia- betic flour, meat.	48 oz. milk, water, soda.	60	1042	Reac. acid, 1 stool, nor- mal.
6	34 oz. diabetic flour, veg. meat.	28 oz. milk, water, soda.	49	1040	Reac. acid, sugar 18 grs. per oz.
7	30 oz. diabetic flour, veg. meat.	60 oz. milk, water, soda.	56	1037	Reac. acid, sugar 16 grs. per oz.
8	52 oz. diabetic flour, cheese, meat.	124 oz. milk, water, soda.	104	1039	Bile, sugar 21 grs. per oz.
9	36 oz. diabetic flour, cheese, meat.	38 oz. milk, water, soda.	48	1042	.....
10	58 oz. diabetic flour, meat, veg.	76 oz. soda. Vichy, milk.	52	1042	Acid, bile.
11	58 oz. diabetic flour, fish, meat	48 oz. milk, soda, water.	47	1034	Reac. acid.
12	62 oz. diabetic flour, cheese, meat.	64 oz. milk, soda, water.	70	1036	Reac. acid, normal.
13	76 oz. diabetic flour, cheese, meat.	76 oz. milk, soda, water.	59	1036	Bowels normal.
14	56 oz. diabetic flour, cheese, meat.	56 oz. milk, soda, water.	48	1031	Sugar 6 grs. per oz.
15	50 oz. diabetic flour, cheese, meat.	64 oz. milk, soda, water.	51	1031	Bowels normal.
16	78 oz. diabetic flour, chicken, meat, veg	56 oz. milk, soda, water.	30	1034	Reac. normal.
17	84 oz. diabetic flour, meat, veg.	58 oz. milk, soda, water.	52	1031	" "
18	72 oz. diabetic flour, meat, fish.	60 oz. milk, soda, water.	48	1034	" "
19	64 oz. diabetic flour, meat, veg.	80 oz. milk, soda, water.	50	1032	" "
20	86 oz. diabetic flour, meat, cheese.	90 oz. milk, soda, water.	64	1032	" "
21	86 oz. diabetic flour, meat, cheese.	90 oz. milk, soda, water.	.....	1033	" "
22	86 oz. diabetic flour, meat, cheese.	90 oz. milk, soda, water.	.....	1032	" "
23	86 oz. diabetic flour, meat, cheese.	90 oz. milk, soda, water.	.....	1034	Sugar 3 grs. per oz.
24	45 oz. d. flour, meat.	50 oz. milk, soda, w'r	36	1034	Reac. excess acid,
25	58 oz. " " "	52 oz. " " Vich	36	1034	No sugar.
26	34 oz. " " "	48 oz. " " w'r	33	1031	" "
27	30 oz. " " "	64 oz. " water.	55	.....	Trace of sugar.
28	52 oz. " " "	56 oz. " " "	49	1032	Sugar 3 grains per oz.
29	44 oz. " " "	68 oz. " " Vich	53	1033	Ex. acid.
30	42 oz. " " "	48 oz. " " "	47	1042	" "
31				1036	" "

Feb. 1 to 15, bowels regular, occasionally constipated. Weight increased to 162 lbs. Treatment, 1-20 gr. nit. strychn. 3 times a day, and pepsin and Bismuth sub. nit. occasion-
ally. No signs of sugar up to Feb. 17. Patient has resumed his usual occupation.

March 23. Mr. Simpson has lately detected some signs of sugar as shown by a pale yellow deposit on applying Fehling's test. Thinks the patient must have transgressed in the matter of diet.

I have repeatedly examined the urine since, and with the following results: The first note is dated February 20, but refers to a specimen of old urine passed before the use of strict diet. Found by Fehling's test 40 grains of sugar to the ounce.

May 2. Specific gravity 1032. Three parts of urine required to decolorize Fehling's. Nevertheless, next day test-tubes showed gamboge colored deposit, indicating sugar, and the urine, on fermentation, showed 10 grains of sugar. Had relaxed diet somewhat lately.

May 5. Yeast showed 5 grains of sugar, though Fehling's test showed more. How explain this discrepancy? Can the yeast reduce the specific gravity without the presence of sugar? Urea 16.7 grains to the ounce, double the average. Specimen tried after the addition of yeast, showed 10.3 grains of urea.

May 6. Specific gravity 1034.

May 7. Tried with domestic yeast. Stands even higher than yesterday. Added Fleischman's yeast.

May 8. No change. Urea 15.27. A new specimen taken to-day shows specific gravity 1031.

May 9. No action by yeast. 10th, same.

May 17. Specific gravity 1029. Has been using common flour.

May 21. Specific gravity 1026, strongly acid. Pulse to-day 54. No trace of sugar. Looks perfectly well and says he feels so.

May 24. Tested for sugar without result, although he has been using milk very freely by my advice. Lactose then does not appear in the urine. It is dis-

posed of in the organism. On boiling, there was a slight cloud which cleared off by nitric acid, showing phosphates.

May 28. Since last date the urine has been examined three times. Specific gravity 1031. Urea from $9\frac{1}{2}$ to $12\frac{1}{2}$ grains. No sugar, though he has used milk in the following quantities: 24th, 72 oz.; 25th, 64 oz.; 26th, 96 oz.; in all, 232 oz. in three days; being an average of 77 oz., or about 5 pints per day.

This young man feels well, has recovered his old weight, and gone even beyond it; arm measures 14 inches around. Still uses Camplin flour.*

NOTES OF F'S CASE.

I give this case as a contrast to that of M—. He is a young man about seventeen, and has been afflicted with the disease over a year. It is about so long since he first consulted me, but my notes do not extend back further than a few months.

Residence, 307 Warren street. When I first saw him he was very thin, and is now, if possible, still thinner, being in that respect like a person in the last stage of phthisis—yet there is no evidence of lung disease. The pulse is frequent. He was put on anti-diabetic diet, and strychnia and iron. In December

* Note.—June 20. Specific gravity 1032. Urea 12.17. No sugar. Much phosphates.

July 11. Learning from M. that he had left off the use of Camplin flour and substituted that of the gluten flour, I tested his urine and found it with a specific gravity of 1040, and containing 20 grains of sugar to the ounce; urea 7.04 grs. All this without his being aware of the recrudescence of his disease. He has never suffered from the urethral irritation which is so common in diabetes. So it seems he is far from cured after all. Mark the reduction in urea accompanying the reappearance of sugar.

July 18. Has resumed the Camplin flour. Urine, specific gravity 1030. A mere trace of sugar. Urea 13.43 grains. Attributes the recent appearance of sugar to having indulged in ice cream.

last, he called on me again. His mother reports that some nights he passes three or four quarts of water ; appetite not so ravenous as formerly, nor does he suffer so much from cramps of the muscles and dizziness, and roaring of the ears ; very weak, and his temper extremely irritable, so bad that the family can scarcely endure him about the house. Has never followed strictly the diet prescribed.

Left a prescription of alcohol and carbolic acid, equal parts, three drops three times a day.

March 15. F. brought a specimen of his water, specific gravity 1044 ; pulse 100 ; palpitation of the heart, but no organic disease there. Has to get out of bed to relieve his legs of cramps.

25th. Urine, specific gravity, 1040. By volumetric method, sugar estimated at 38 grains, by fermentation found to be the same. Discharge from the orifice of the prepuce of an acrid, irritating character, owing to the saccharine quality of the urine ; pulse, 92. Has abandoned the Camplin flour, and for some time taken to eating pancakes with molasses. He measured the quantity of urine passed in twenty-four hours, and reports six quarts and a pint. Formerly he says he passed the enormous quantity of twelve quarts.

April 8th. Put F. on the use of a mixture (from Dr. Whittingham), of 15 grains each of salicylic acid and bi carb. potass., and 45 grains phosphate of soda, 3 times a day, after meals.

April 16th. Specific gravity, 1040 ; sugar, 35 grains. Medicine last given half consumed—declines to take any more ; urine, about 3 quarts per day ; pulse, 82 ; temperature, 98° ; eats ordinary bread, but avoids potatoes and sugar. Low spirited—wants to be employed, and thinks he would be better if he had work—but too feeble to do much.

April 20th. Urine, specific gravity, 1040. It is 12 days since he commenced the salicylic acid mixture, and still no considerable change, except in the quantity of urine—thinks there was some improvement under the carbolic acid.

F. gave to-day the measured quantity of urine passed from March 23d to March 28th, $6\frac{1}{2}$ quarts, 7, 7, $6\frac{1}{2}$, 7, $5\frac{1}{2}$ —average, 6.6.

24. Urine contains 40 grains sugar; specific gravity, 1040—and fermentation brings it down to zero. Only 1.85 grains of urea; at four quarts a day, he passes 236 grains of urea, instead of 400 or 500, as he should.

May 7th. 35 grains sugar; urea, 1.44.

16th. Specific gravity, 1033; sugar, 24 grains. Absolutely declines to take medicine or diet himself.

May 22d. Urine contains by vol. analysis, $34\frac{1}{2}$ grains sugar; specific gravity, 1037—reduced to zero by fermentation.

23d. Used Piffard's test, (caustic soda ʒii , sulph. of copper ʒi , tart. of soda and potash ʒv), and found a lighter yellow deposit than with Fehling's—a lemon color.

25th. Urine contains but 1.17 grains of urea.

The process used for determining the quantity of urea, is to fill a tube closed at one end, and graduated to 50ths of an inch, one-third full of mercury—on this put ʒss . of the urine, and complete with liq. sodæ chlorinatæ (Squibb's); then invert in a saturated solution of common table salt. The mercury of course passes out, and is replaced by the saline solution, which being denser than the Labarraque's, stays below—leaving the latter to liberate the nitrogen. Of course the gas ascends, occupying the upper part of the tube; after the process is ended, the quantity is

read off in hundredths, and multiplied by .645, that being the fraction of a grain of urea which corresponds to a cubic inch of nitrogen. This again multiplied by 16, the number of half drams in an ounce, tells the proportion of urea per ounce in the specimen under examination, a certain allowance being made for a temperature much above, or below 60° Fahrenheit.

I have placed the history of this young man's case in juxtaposition with that of M., because of the contrast it affords in its march and behavior to the latter. M. exhibits force of character, self control, will, and determination to abstain from everything hurtful to him. F. has completely given way, fallen into despondency, and apparently made up his mind to eat and drink whatever suits his palate, even if it kills him, which it is very likely to do. Nothing I could say, can better illustrate the statement made by writers on this subject, that a man's fate is in a great measure in his own hands, and that the victim of it has henceforth to eat to live, and no longer, if he did it before, live to eat.

Mrs. W. This is the case of a lady, over sixty, wife of a venerable clergyman of the Methodist Episcopal Church. She first consulted me ten years ago, when the disease was distinctly recognized. She was urged to adopt a rigid diet, and received by way of medicine iron and strychnia. She fell out of my list as a patient, and I had no occasion to see her, except in the street, till a few months ago. But in our street interviews, she told me that she had got tired of the diet, and long ago abandoned it. She was aware that the disease still persisted, but she enjoyed a measurable degree of health, and was forced to be content with it. My memoranda are only of the later period of her disease.

The first entry is under date of December 8th, 1877. The urine is so loaded with sugar as to be sticky and adhesive, so that if any dropped on the floor, and she trod in it, that quality was very evident. In her case there has never been an enormous appetite ; it is, on the contrary, rather below the average. She is quite fat and plump, with a pasty, pale complexion. She suffers agonies from cramps in the left leg, coming on usually at 4 o'clock in the morning. Pulse, 96 ; respiration, 20. Has attacks of vertigo, which first seized her three years ago. On one occasion, while writing a letter, fell to the floor but did not wholly lose consciousness. Eyesight getting bad. Hearing unimpaired, though has *tinnitus* and a discharge from the ears. When she found her state unchanged by treatment, resolved to go on and work as if nothing was the matter. Her family was large and her household duties arduous ; and probably to the exercise she was forced to take, is due her survival to the present time, in, comparatively, such good condition. Passes about a gallon of water in twenty-four hours, which, if left awhile, gives out a beery odor.

Thinks she can date the commencement of her disease back to the death of a child ten years ago. Much tormented with thirst. Was much annoyed with pruritus about the anus and vulva, for which she used Glen's sulphur soap with complete relief. Complains of constipation, (a common accompaniment of the disease), but thinks a residence at the sea shore last summer, has left her better in that respect.

Feb. 1st. Mrs. W's legs are considerably swollen ; pitting on pressure. The pains in the soles of the feet are as if some one was cutting them ; also feels as though pins were being thrust under her toe and finger

nails. Swelled feet in diabetes without albuminuria, must be unusual, as Beale says he has met with only one case of it. Other writers speak of it as more common, and yielding readily to the use of martial remedies. Pulse 88. Appetite moderate, but thirst intense. Urine of an ember color; specific gravity, 1040. Has procured the Camplin flour by my advice, but not used it yet. Takes sugar freely in her tea and coffee; in short, does not restrict her diet at all. Has promised to begin dieting soon. Fermentation showed 30 grains of sugar.

27th. Urine, specific gravity, 1040, and quantitative analysis by Fehling's test, showed 24 grains of sugar.

The husband, who brought it, mentioned his wife's temper and disposition as being impaired by the disease, but without the least blunting of her mental faculties; on the contrary, she was, as he expressed it, "as sharp as a brier."

April 9th. Urine, specific gravity 1040. 25 grains of sugar.

27th. Urine, specific gravity 1033. 14 grains of sugar. Urea 8.66 grains.

30th. Specific gravity 1030. Sugar 9 grains. Urea 7.84 grains.

May 4th. Specific gravity 1030. Sugar, estimated by analysis, at 9 grains. Found it by fermentation to be 11 grains.

May 8th. Specific gravity 1014. Less than 6 grains of sugar. Has been for some days on a salicylic acid mixture of Dr. Whittingham's. Has taken to using biscuits made out of gluten flour (containing considerable starch) which ought to have increased the sugar; but which is much more palatable to her than the bran flour. Urea 2.65 grains. Urine reduced in quantity

to three pints a day. She thus excretes 115 grains of urea. But estimating her weight at 156 lbs., if, as Dickinson says, the normal excretion (average) is 3 grammes to the stone, she should pass over 500 grains per diem; more than four times as much as she does.

May 10th. Specific gravity 1014. Sugar 4 grains.

May 17th. Specific gravity 1033. 9 grains of sugar.
9.49 grains urea.

This remarkable diminution in the quantity of sugar does not seem to have been accompanied by a corresponding improvement in her symptoms. Can the reduction have been due to the salicylate of soda treatment? It appears to have been coincident with it.

The swelling of the legs has quite disappeared under the use of iron, but the pains in the feet are as severe as ever.

This lady has lived longer than any one I have met with in diabetes, and bids fair to live some years yet, though she herself talks in a desponding tone. Some time ago she had a severe attack of bronchitis, but it has subsided, and there is now nothing the matter with her lungs.

The thermometer in the axilla on two occasions stood at 98° and 96°.

She has attempted to adhere to the diet but has only partly succeeded. Has used ordinary as well as gluten flour, but no sugar. Less resolute than M., but more so than F., in obedience to instructions, her improvement occupies a similar relative position.

MRS. WII'S CASE.

I owe my knowledge of this lady's case to Dr. Smith, of Irvington, whose patient she is. She is, besides, a connection of a patient of mine, in company with whom I called on her January 17th, last. She

is a widow about 35, who along with glycosuria has phthisis. Found that four years ago, and before the death of her husband, she had symptoms of diabetes. The lung complications were not developed till within a year past, and then, as she thought, from taking cold. At present there is complete dullness on percussion on the anterior and upper part of the right lung, with moist rales and bronchial or even cavernous respiration. Pulse rapid. Has lost much flesh, though still retaining considerable embonpoint. The night sweats, which had been most obstinate and troublesome, notwithstanding the resort to various remedies, including the time-honored elixir of vitriol, two months ago yielded to a cold infusion of dried sour apples, and had not reappeared. Passes, by her estimation, four quarts of urine daily. Suffers much from irritation about the vulva, from which, however, she obtains partial relief by the use of borax water applied as a lotion. Takes no cod liver oil at present, on account of the gastric disturbance it occasions. My friend, Mr. S. S. Simpson, found the specific gravity 1040, and the sugar, by the fermentation test, 28 grains. This would be about $7\frac{1}{2}$ ounces per diem. Recommended the Camplin flour.

March 27th. Called on her again, and found her suffering from an increase of the pulmonary disease. Some moist rales at the apex of the left lung also. For two weeks has deviated from the strict rule of diet, and has used saccharine fruits, though not sugar in tea or coffee. Declares herself worse, and is disposed even to use sugar and whiskey, in accordance with a popular newspaper prescription, "for the healing of her lungs."

Thinks the quantity of urine was much diminished

by the diet, and that if the irritation about the vulva had vanished, she would have had little to remind her of her complaint. Thirst and appetite nearly normal. I have not seen this lady since, though I hear she continues about the same. This is the only case of lung disease in connection with diabetes that I have encountered. It will probably be the immediate cause of death, though that issue may be postponed longer than in true tubercular phthisis. It is a delicate question how far rigid diet should be insisted on in this case. An interesting feature is the recurrence of menstruation, after its suppression for several months.

Mrs. Wh.'s urine was examined a second time April 16th. Specific gravity, 1016. Sugar, 6 grains. Urea, 3.088 grains. Was this diminution of both products caused by the extension of the pulmonary disease? and will the diabetes leave before death? It is probable.

CASE OF WM. W.

Dec. 21, 1877. Called to make inquiries about a boy, Wm. W., whom I attended several years ago with diabetes. Learned that he had been dead three years next February, almost six months after my last visit, and three years after the commencement of the disease. When he died his age was 15; so he must have been 12 when attacked with it. He worked at hatting, and was first taken with earache and otorrhœa, also dizziness, for which he left work, and never resumed it. When I saw him, he had the enormous appetite and thirst, together with the abundance of sugar in the urine which characterize diabetes. Was also listless and apathetic. Had been plump, but was greatly spent. No paralysis or other cerebral troubles. Died without complications, but simply from exhaustion.

ST. BARNABAS.

Feb. 5th, 1878. Dr. Archibald Mercer, House Physician of St. Barnabas Hospital, called my attention to a light mulatto, 28 years of age, just admitted with diabetes, who said that he was passing nine quarts of urine daily. He has suffered from the disease for three years, with the usual symptoms. Dr. M. found the specific gravity 1050. No nervous symptoms. Slight evidences of indigestion. Some gastric acidity. Pulse 60. Worked at loading coal wagons. Has latterly failed in strength. Appetite insatiable, but (he thinks) no extraordinary thirst.

This patient, I learn from Dr. M., became very unruly; would seize the other patient's food, and refused to submit to restricted diet; so was soon discharged.

SLIGHT AND INCIPIENT CASES—DR. X.

This is the case of a physician, 56 years of age, who made the discovery of his being the subject of glycosuria, August 13th, last, and thus records his observations:

"I was led to examine the urine by the fact that, I was obliged to rise once or twice every night to micturate, and the vessel was more than half full in the morning of a pale urine with a sweetish odor. I had also remarked an irritating quality about it, causing itching at the end of the prepuce; and furthermore, that for nine months past there was a certain obsolescence, not fairly due to years. I at once procured the anti-diabetic flour, and have ever since restricted myself to it. Made my first supper off of it, with cabbage, cheese, and unsweetened tea, and slept without rising as usual. The quantity, too, was but about six ounces. Tried again, as before, with Moore's

test—liq. potassæ—and could see no darkening of the urine; nor could a professional friend, who added his observation to mine.

Next day, 14th, consulted Dr. Alonzo Clark, who kindly undertook to analyse a specimen, and recommended no medicine, at present, but simple reliance on the diet I had commenced; that is, meat, fish, green vegetables, and coffee and tea without sugar. No fruits.

I would premise that I have never been ill; but have for a long time had a sort of crapulent dyspepsia, such as is consistent often with an excess of adipose. After sweet things, such as ice cream, &c., would often be annoyed with acidity and vomituration; and had, at such times, even suspected an organic affection of the stomach with *sarcina ventriculi*, but never made a microscopic examination to determine the point.

Am a man of quite active habits; used to ride horse-back a good deal, and for years have taken a cold splash or sponge bath every morning, on rising from bed. My standard weight was 200 lbs., but it once, when on a short recess, and relief from ordinary professional pursuits, rose to 207 lbs. This, as is obvious, was too much for a man of my height, 5 ft. 8½ in., even allowing for the effect of advancing life, in one no longer young. With this excess of fat, which was somewhat accumulated, as is unfortunately too apt to be the case with corpulent people, in the front of the abdomen, was associated the tendency, on every active exertion, “to lard the lean earth” with sweat, as Shakespeare makes the fat knight to do. A great consumer of water. Subject to perspirations at night, which at times are unilateral. Have for years had *lunulus*, and used to be affected with vertigo; so bad

occasionally that I could hardly get home in my buggy. Twice have fainted away, and lost consciousness completely. Never, however, had headaches. Have sustained no severe moral shock ; had no annoyances beyond the common lot ; never was addicted to drink to excess, though not a tetotalter, and would take a glass of wine, or several glasses of lager when with friends, but seldom or never distilled liquors, for which I had a distaste. Have long abandoned the use of tobacco.

Aug. 14th. I remarked a singular absence of thirst this morning. Breakfast consisted of three eggs, (hard), a cup of coffee, without milk, or (of course) sugar, and one or two Camplin biscuits, made, as in the formula accompanying the package, with eggs, milk and butter.

I notice with pleasure, that dyspepsia (my old enemy) is absent ; pulse has for some time been somewhat accelerated—this morning it is 92. I should mention that the form of dyspepsia with which I was cursed was accompanied with loose mushy stools, several daily, in a state of apparent fermentation. I had even thought I might claim to be a victim of chronic camp diarrhœa, a relic of the war, in which I was a participant, but I had scarcely gone so far as to claim a pension on that account. A little bronchial cough, but of no significance ; also aching at top of right shoulder and a sensation of fullness about the right hypochondrium, which I attributed to some congestion of the liver, though, with a doctor's dislike of physic subjectively, I had not dosed myself to obtain relief. Cramps of the legs have annoyed me of late—especially of the peroneal muscles ; also prurigo, more particularly of the back of the hands in warm weather.

Have drowsiness—inclined to fall asleep in a chair. As to mental phenomena—some failure of memory especially of people's names. Not gloomy or melancholy, but, like Mark Tapley, inclined rather to be jolly even in adverse circumstances.

Aug. 15. This morning, after an undisturbed night, passed six ounces of a darker hue and an unirritating quality; pulse 72. Urine scarcely a shade deeper on trying it with Moore's test. Tried it for albumen, also without result. P. M. Specific gravity, after a dinner of hash with onions, cold slaw, Camplin biscuits and milk and water, 1024. Weight to-day, 196 pounds.

16th. Visited patients on foot yesterday, and perspired profusely. Ice water and plain soda. Slept well from 9 till 2, after which, tossed from side to side till morning; acid stomach, thought to be due to cheese eaten at supper. Urine, six ounces as before.

17th. A friend tested the urine after Trommer's method, and found no trace. This friend is constantly in the habit of seeing the reactions in cases of diabetic urine, and his opinion is conclusive. There is then, at present, no evidence of a pathological quantity of sugar in the urine. P. M. 17th. To Coney Island, where had a sea-bath; was weighed and stood at 195; lifted 550—used to lift 600.

Find lettuce salad with mayonnaise dressing an admirable resource to fill the gap made by the withdrawal of all starchy and saccharine articles from my dietary. Yesterday a copious deposit of uric acid in the urinal. The same thing some time ago.

18th. Fried egg-plant at dinner—some irritation in micturition, but no increased flow. Supper—tea, smoked beef, and Camplin. Went through the night

(7 hours) without micturating ; then only six ounces.

19th. With Trommer's test, deposit pale blue—not red ; specific gravity, 1020.

20th. Much walking, by which thoroughly tired ; sleep bad, disagreeable dreams. Yesterday, stool figured ; but one per day since commencing the diet. To-day's, part solid, part liquid.

21st. A wretched night. Afternoon to Coney Island for a bath. Weight, 192 lbs. ; lifted 575 lbs.

23d. Urinary irritation all gone. I used to attribute it to a possible commencing prostatic enlargement due to advancing years—but it must have been due to the exciting quality of the urine.

28th. Weighed to-day 185 lbs.

30th. A figured, apparently perfectly natural stool. No signs of dyspepsia. Pulse, before breakfast, 64.

31st. A sea-bath, and weighed 187 ; a gain of two lbs.

Sept. 3. Absolutely no symptoms of dyspepsia, from which I have suffered so many years. Every day on horseback or walking. Diet of Camplin and meat, with green vegetables, and eggs, not so appetizing as the former mixed diet—of which was thereby tempted to eat more than was required for health, or was compatible with it. I think my diabetes must have been of the dyspeptic variety, yielding with that complaint.

Sept. 5. Diet—breakfast, a biscuit, 3 eggs, an ounce of cottage cheese and a cup of tea ; dinner, a couple of lamb chops, broiled, biscuit and endive salad ; supper, 3 or 4 slices of German sausage, biscuit, a couple of ounces of cottage cheese, and a cup of tea. Two or three glasses of milk (sweet or butter) through the course of the day.

Sept. 17. Have just returned from Long Branch.

where I spent a week taking sea-baths, (nine all told), generally in the morning at 5½ o'clock. Took my biscuits with me so as not to infringe the rule. Long walks to Ocean Grove, to Branch Port, &c., crabbing and fishing (sea) occupied the time.

Sept. 20. Weighed 182 lbs.

Oct. 4th. Urine specific gravity, 1016 : weight, 180½ lbs.

Oct. 25. Returned to-day from a professional visit to a distant part of the country where I was detained about three weeks—when the Camplin biscuits gave out, resorted to bran from the coarsest quality of flour which had been cleared from starch by thorough washing—this answered as a tolerable substitute—weight reduced to 179 lbs.

Jan'y 7th. Learned from Dr. Clark that the specimen I left with him contained sugar, and had a specific gravity of 1030. He advised me to continue my rigid diet for a year.

May 20. Still continue the anti-diabetic diet, now over nine months, without transgressing in a single instance. The urine has shown no trace of sugar since it was first discovered and the diet entered on. The dyspepsia is gone with the glycosuria. Specific gravity of last specimen tested, 1020. Boiled with three parts of Fehling's solution, color of latter not discharged. The *linitus* still persists together with some of the old shoulder pain.

As to the special debility before pointed to, it is all gone with the dyspepsia. Camplin flour is a good aphrodisiac, better than phosphorus. Weight, 185 lbs. I attribute the disappearance of the glycosuria, first, to the rigid diet never relaxed—and next, to the active locomotion on foot and on horseback.

*A. B., æt. 41, native of U. S., married nine years, professional man of a stout build and robust constitution, who had enjoyed excellent health until the spring of 1874, at which time his professional duties becoming more laborious, which, together with his literary work, scarcely allowed him four hours of sleep during the twenty-four. At this time and during the preceeding year, he had noticed that his urine was frequently loaded with urates, and occasionally free uric acid was present. During the subsequent eighteen months, (from spring of '74), there was no abnormal symptom except possibly the excess of urates; he remained unceasingly at work without ever taking a day's vacation. During the latter part of 1876, and the beginning of 1877, he noticed that, after having closely and continuously applied himself for any length of time, he suffered with acute occipital pains extending into cervical region; these attacks, however, were few in number and of short duration, and no importance was attached to them at the time. His tongue was covered frequently with a thick greyish fur—a condition which he attributed to smoking, as he was an habitual smoker, using eight to twelve full flavored Havanas per diem. His health during the early part of this year (1877), was comparatively good. No loss of appetite nor of strength. Diet always of richest variety and of best quality. Rarely uses alcoholics. During the winter his sleep was unrefreshing, frequently disturbed by disagreeable and frightful dreams. During February and March he was annoyed with frequent and severe cramps in the lower extremities—especially in the gastrocennial region—during the night, but only while in bed. He notices that he has not the

* This case was communicated by a medical student, who applied the tests.

same disposition, nor ability to apply himself to his studies. His countenance became anxious and careworn. His wife calls his attention to the fact that he is always complaining of being chilly when in the house. There is some emaciation, first apparent in his face, and soon becoming more or less general. About the first of March there was a general feeling of indisposition. Skin dry, sallow and rough; chloasma on the neck; gums spongy and bleeding occasionally; tongue thickly furred, brown in centre, and exceedingly dry in the morning—edges less dry and less brown. For two weeks he suffered with thirst every other day, in the afternoon—never in the morning. This condition became more marked about the first of April, at which time, observing the periodicity of the attack, he took a purgative dose of calomel, followed by full doses of quinine, to the amount of ʒiij during two weeks. Following each one of these attacks, and only then, there was some diuresis. It was especially marked that his thirst and diuresis were not accompanied by any fever.

April 24th. He left a specimen of his urine at this office, and, on examination, I found specific gravity 1038, and considerable quantity of glucose. During six subsequent days careful analyses of his urine were made with the results herewith given :

Day.	Amt. of Urine.	Color.	Re- action.	Sp. gr.	Amt. of Glycose	Deposit.	Microscopic appearances.
April 25 1st	oz. 34½	Amber.	Acid.	1030	grs. 345	Amorphous	Urates: a few
" 26 2d	42	"	"	1030	light col'd. 137	Amorphous	epithelia.
" 27 3d	37	Brown.	"	1028	light pink. 56	"	" free uric acid
" 28 4th	32	ish red.	"	1026	pink. slight	"	" " "
" 29 5th	35	Amber.	"	1025	trace.	"	" " "
" 30 6th	36	"	"	1024	"	Amorphous	" little epithel
					light col'd.	"	" " "
					none.	"	" " "

Thus it will be seen that at no time was the urine abnormal in quantity or reaction. Quantitative ex-

amination of the glycose only was made, and this was present in any marked quantity for three days only. The deposit, excepting three days, was amorphous, and during that time was hardly abnormal. Free uric acid crystals were noticed during three days. It has been previously remarked that free uric acid and abundance of urates were present in his urine, at various times previous to 1874. The microscope never revealed any casts, nor has there been any other symptom indicative of renal disease. Each quantitative analysis of the glycose was conducted in three different ways, viz.: 1st. *Fermentation test.* 2d. *Fehling's test liquor.* 3d. *Robert's differential density method.* Moore's test was used as a quantitative test. It is unnecessary to describe the *modus operandi* of these respective tests—suffice it to say that there was but slight variation in the results. Since the first of May, daily or weekly examinations of his urine have been made. There was not the slightest trace of glycose until the 31st of May, when he was exposed on horse-back to a drenching rain and hail storm. Immediately afterwards glycose appeared in his urine, and traces of it remained for two weeks, and then entirely disappeared. No traces of glycose reappeared until the first of September, when he had occasion to apply himself closely to some mental work, following which a small amount of glycose was present for a few days only. Again, during the latter part of the same month, he became very angry at an offending person, and within two hours after the occurrence glycose appeared in his urine, but remained only a short time. Albumen has not been present at any time. There never has been any affection of the skin since the conditions previously mentioned. No ascites

nor dropsy. No disturbance of the digestive organs, excepting two or three short attacks of diarrhœa. No declension of vigor of sexual functions. No dizziness. No impairment of vision, except for about two hours on Sunday afternoon, April 29th, when, as he had occasion to take up a book, he saw the letters in red instead of black. This phenomenon is interesting, as it was directly associated with and apparently dependent on the last traces of glycese in his urine.

TREATMENT.

Shedden's diabetic flour, with abstinence from nearly all amylaceous materials for about two weeks; then gradual return to normal diet. Free exercise in open air; brisk friction of skin every morning.

DR. Q.'S CASE.

Dr. Q., a large, portly man, weighing 250 lbs., allowed me to test some of his urine. He told me that it had been tested before, (as he had frequent occasion to get up in the night to micturate, and passed, habitually considerable quantities of water), but no sugar was found. This time, however, it was present in appreciable quantities. With Fehling's test there was dense greenish deposit thrown down, which at the bottom was pale yellow. Specific gravity, 1024; reduced by fermentation to 1019; 5 grains of sugar.

This gentleman has suffered from rheumatoid symptoms, and his legs have been swollen. Had a brother who died of diabetes.

A remarkable feature in this connection, is that the last month instead of losing weight he had even gained five pounds. But of course this is not yet a typical case of diabetes; only slight glycosuria, which however

may become confirmed unless attended to. The con-sanguinity feature too is to be remarked.

NOTE.—While these pages were passing through the press, I chanced to meet with three other cases of glycosuria, of which I will give a condensed summary.

The first is a man of middle age, a peripatetic agent, who called in the way of his business, and incidentally mentioned the fact that, five years ago, he was seriously affected with the disease; from which however he had now, as he thought, quite recovered. He abandoned his rather sedentary occupation and took up his present more active one, and carefully restricted his diet, which did not include the Camplin flour, for he first heard about it from me. He attributed much of the good issue in his case, to an abundant use of buttermilk. Medicines he had taken but little.

The second case was that of a widow, 50, four children, the youngest grown up. Ever since ceasing to bear children has been growing fleshy, till in April last, she turned the scales at 228. The immediate occasion of my seeing her was that she was covered with a copious eruption of furuncles, which did not spare even the region of the hair, but were most abundant, and largest, at the lower part of the back and on the thighs; in these places they reached a diameter of several inches, and deserved the name of carbuncles, from which she has suffered twice before—two years ago, and again, no later than six weeks before the date of my being called. Her obesity, and the skin affection together, led me to examine the urine—though she gave no hint of disorder in that quarter—and I found it of specific gravity 1025, and containing 14 grains of sugar, and urea, 6.81 grains per ounce. Quantity, 5 pints per diem. No vulvar irritation, but these parts attacked with furuncles—to which circumstance is to be attributed the occurrence of pus in the urine, as developed by the microscope. Always a great water drinker, but never cared for sugar or deserts. Remembers that polyuria accompanied the attacks of carbuncles before, and also that she suffered much from irritation of the skin in hot weather. Twelve years ago her teeth began to drop out, from recession and sponginess of the gums, till now she has almost none left remaining. Never had a suspicion of diabetes, as her appetite and digestion appeared normal, and her only sickness consisted of a bilious attack, which came regularly twice a year in the form of cholera morbus. Her daughter remarks that her temper grew irritable and cranky two years ago, and so continues. Mind and memory unimpaired.

She is now, July 23, in a most critical condition, being delirious, and threatened with most extensive bed sores, notwithstanding I at once put her on a water bed. There is no family history of diabetes. Can she have had the disease as long ago as 12 years? and is it intermittent, as authors say it sometimes is? It probably was present in the two previous attacks of anthrax.

The third is the case of N., aged 38, an inmate of the New Jersey Home for Disabled Soldiers, who weighs 325 pounds, on which account I tested his urine, though he claimed to be in perfect health, and remarked nothing peculiar about that secretion. He has been a teetotaler for four years past, and uses very little

Induced by what Dickinson has written on this subject, I addressed a note to Dr. Ward, of the Asylum at Trenton, and Dr. Smith, connected with that at Morris Plains, and personally saw Dr. Cross, in charge of the County Asylum at Newark, asking their kind co-operation to ascertain what amount of glycosuria there might be among the patients under their charge. Dr. Ward has been so good as to send me a list of 34 patients examined,* including five with epilepsy, six with melancholy, ten with dementia, five with chronic mania, two with acute mania, one with idiocy, and one recovered ready for discharge.

Of these he found one with sugar in large quantity (melancholia), one (acute mania) sugar in considerable quantity, one (melancholia) moderate quantity, and six distributed among all classes presenting traces on standing several hours. Nine in all, or nearly 25 per cent.

I had asked these gentlemen to try, say $\frac{1}{2}$ dram of Fehling's solution, by adding to it when boiling an equal, a double, and a triple or greater quantity of the urine, renewing the boiling after each addition.

sugar. Quantity of urine, 76 ounces in 24 hours; specific gravity of the first day's specimen, 1014, of the second, 1030; sugar in the first, 5 grains, urea, 4.18 grains; in the second, sugar, 19 grains, urea, 5.16 grains per ounce. Urea less than one-third the normal quantity. Heat throws down earthy phosphates. Examined several months ago because of the rather unusual amount of water passed, and as he was remarked for drinking excessively of liquids, but found nothing at that time. Can this be also a case of the intermittent variety? And why should the sugar increase fourfold in one day without difference of diet? Also, why did the urea increase instead of diminishing?

The clerical gentleman whose case has been alluded to above, called to-day, (July 23), and appeared to be in robust health, but said since I last heard from him he had experienced a relapse, passing for a short time a gallon a day, and suffering, for the first time, from urethral irritation and discharge. He was now even using ordinary flour. With Fehling's test, which he applied weekly, he discovered a slight amount of sugar still. He praises buttermilk as a beverage in diabetes.

Dr. Smith reports that he "found few specimens of urine in which the color was not changed with the second or third half dram, and only two which did not yield with the addition of the fourth half dram, but in no case has he found, by using the tests recommended by the author at hand, satisfactory evidence of the presence of sugar."

In the County Asylum, out of 48 cases examined, there were found six cases where sugar existed in appreciable quantities, or one in eight.

At the N. J. Soldier's Home, the urine of 73 men was tested with great pains, by the steward, J. H. Post, at my request, with the result of finding sugar in six cases in appreciable quantities, or one in twelve. In none of these cases, either in the Asylums or in the Soldiers' Home, had the presence of sugar been suspected. There were none of the symptoms that go to make diabetes. The only inference to be drawn is that glycosuria is of frequent occurrence in slight form in persons in broken health, as all these were. These cases together with those in which I have found slight traces of glycosuria in connection with other diseases, and even physiological conditions (as on the one hand, acute and chronic albuminuria and hysterical urinary profluvium, and, on the other, lactation, suggests that a slight glycosuria is very common, and very commonly overlooked, because not at all suspected; belonging to the border land between a state of health, and one of disease, and requiring cognizance on the ground of the ancient warning "*obsta principiis*," and Seneca's excellent line, "*Pluris est labantem sustinere, quam lapsum erigere*."

CONCLUDING OBSERVATIONS.

Whatever may be the real pathology of glycosuria,

it seems fair to conclude, that it is a symptom of a condition, in which the natural balance between production and consumption is disturbed. Too much sugar is made for the wants of the economy, on the one hand, or too little is destroyed on the other. The treatment then suggested is obvious—to provide the sort of pabulum which will make the least glycese, and to hasten oxydation by active exercise. These are the two legs on which the patient must march, if he would continue to travel the journey of life; and with these he may make shift to get over considerable ground, though at the best with pain, and with a halting gait. He must forego luxuries, including desserts, alcoholic stimulants, and tobacco; live moderately, control his passions of all sorts, and remember always that he is like a man on a tread mill, if he don't keep moving he will go under. Alcohol ought theoretically to be bad, as having a special action on the brain and liver. In a word he must be a practical philosopher, and agree with Sophocles in his tragedy of "Ajax," that "fools never know the treasure's value till the treasure's lost;" in which noble army he most likely ought to reckon himself, for having, by violating the laws of hygiene, got into his unfortunate scrape. I offer my apologies to the adolescent diabetics, and those whose miseries have been prepared for them by ancestors; but leaving these aside, the rest have only themselves to blame, and they must pay the penalty of a future of austerity and sacrifice. Indeed, this is the hard condition on which alone all diabetics, whether to blame or not, hold their lease of life.

NORZ.—Bristowe in his treatise on the "Theory and Practice of Medicine," 1876, gives Fehling's standard solution as follows:

"Sulphate of copper 90½ grains; neutral tartrate of potash, 364 grains; solu-

tion of caustic soda (specific gravity, 1.12), 4 fluid ounces; and distilled water sufficient to make up exactly 6 fluid ounces. 200 grains of this solution are exactly decomposed by a grain of sugar." * * *

"A carefully measured quantity of this fluid, diluted with about four times its bulk of water, should be placed in a large china dish, and heated to nearly boiling point; and a measured quantity of urine, diluted with ten or twenty times its volume of water, so as to reduce the percentage of sugar in the mixture to between one-half and one per cent., should be placed in a burette; then the diluted urine should be cautiously added to the prepared test solution, until the whole of the copper in it has been precipitated in the form of a red powder. The quantity of urine which has been employed in the process can now be read off the scale of the burette; and by an easy calculation the total amount of sugar passed during the twenty-four hours determined. It is, of course, necessary on the one hand to effect the precipitation of the whole of the copper, and on the other, to add no more urine than is absolutely necessary for the purpose. The urine should, therefore be added in drops towards the end of the process, and the effect carefully watched. It may continue to be thus added so long as it produces a light yellow cloud on the surface of the fluid. But when the formation of this cloud ceases to be obvious, it is essential to remove the flame from underneath the dish, and allow the precipitate to fall. As soon as the originally blue supernatant fluid is quite colorless, the experiment is completed. But so long as any tinge of blue remains, the addition of urine to the boiling fluid must be continued."

Where a test-tube is used, instead of a china dish, the best way is to decant the supernatant liquid, and repeat the addition of the urine to it so long as any precipitate falls.

As to the carbonic acid test with a graduated tube, it is, as I have ascertained by repeated experiments, most unreliable for quantitative purposes. It should therefore be discarded.

ERRATA.

Page 8, line 11, *for must exceed read much exceeds.*

Page 9, line 31, *for Curatio diabetes read Curatio diabetis.*

Page 11, line 24, *for Agneola read Agricola.*

Page 21, line 29, *for Harn Analyse read Harn Analyse.*



